PHILOSOPHICAL TRANSACTIONS.

GIVING SOME

ACCOUNT

OF THE

Present Undertakings, Studies, and *Labours*

OF THE

INGENIOUS,

IN MANY

Considerable Parts of the WORLD.

VOL. XXXVII. For the Years 1731, 1732.

LONDON:

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Jos: Banks

To His GRACE

CHARLES

Duke of RICHMOND and LENOX, &c.

My LORD,

I BEG Leave to present to YOUR GRACE this Volume of PHILOSOPHICAL TRANSACTIONS, being a Collection of several Tracts lately read before the ROYAL SOCIETY, whose Meetings You have so frequently honour'd with Your Presence. Arts and Sciences always flourish most under the Protection of Princes and Great Men, who, themselves engaging in the Search after Learning, do by their Examples excite an Emulation among those, whose Business and Profession call them more immediately to the Improvement of the several Branches thereof. I am perfuaded these Papers will meet with a fa-

a favourable Reception from You GRACE; who have not only ſhew Your Inclination to encourage Know ledge in General, by becoming on of the Members of this SOCIETY, bu have likewiſe done a particular Ho nour to the Faculty of Phyſick, b condeſcending to join to the Nobl Titles of Your High Rank, thoſ of DOCTOR in that Profeſſion, an of FELLOW of the College of Phy ſicians, LONDON.

I therefore gladly take this Oppor tunity of acknowledging that I am,

With the greateſt Submiſſion,

My LORD,

Your GRACE's,

Moſt Obedient, and

Moſt Humble Servant,

CROMWELL MORTIMER, *M. D*
R. S. Secr.

Jos: Banks

Numb. 417. Beginning
VOL. XXXVII.

PHILOSOPHICAL TRANSACTIONS.

For the Months of *January* and *February*, 1731.

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390. Ribes fructu parvo. Merret. Pin. Raii Syn. Ed. 3. 456.

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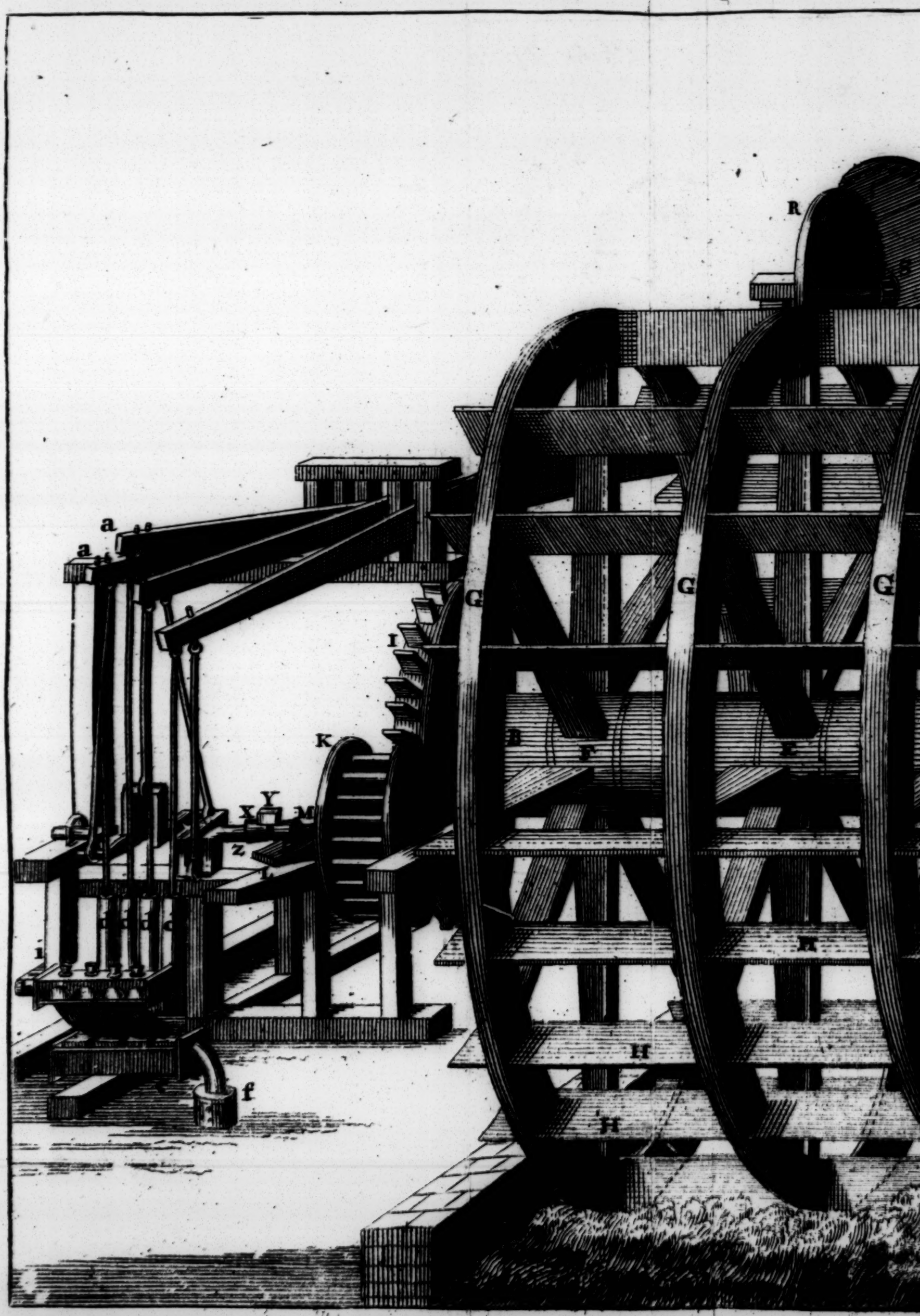
400. Virga aurea minor; foliis ſerratis, utrinque acuminatis.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TAB. I.

Hen. Beighton Sculp.

II. *A Description of the* Water-Works *at* London-Bridge, *explaining the Draught of* TAB. I. *By* H. Beighton, *F. R. S.*

THE Wheels are placed under the Arches of *London-Bridge*, and moved by the common Stream of the Tide-Water of the River *Thames*.

A B the Axle-tree of the Water-Wheel, 19 Feet long, 3 Feet Diameter, in which C, D, E, F, are four Sets of Arms, eight in each Place, on which are fixed G G G G, four Rings, or Sets of Felloes, in Diameter 20 Feet, and the Floats H H H, 14 Feet long and 18 Inches deep, being about 26 in Number.

The Wheel lies with its two Gudgeons, or Centers, A B, upon two Braſſes in the Pieces M N, which are two great Levers, whoſe Fulcrum, or Prop, is an arched Piece of Timber L, the Levers being made circular on their lower Sides to an Arch of the Radius M O, and kept in their Places by two arching Studs fixed in the Stock L, through two Mortiſes in the Lever M N.

The Wheel is, by theſe Levers, made to riſe and fall with the Tide, which is performed in this Manner. The Levers M N are 16 Feet long; from M, the Fulcrum of the Lever, to O the Gudgeon of the Water-Wheel, 6 Feet; and from O to the Arch at N, 10 Feet. To the Bottom of the Arch N is fixed a ſtrong triple Chain P, made after the Faſhion of a Watch-Chain, but the Links arched to a Circle of one Foot Diameter,

Diameter, having Notches, or Teeth, to take hold of the Leaves of a Pinion of caſt Iron Q, 10 Inches Diameter, with eight Teeth in it moving on an Axis. The other looſe End of this Chain has a large Weight hanging at it, to help to counterpoiſe the Wheel, and preſerve the Chain from ſliding on the Pinion. On the ſame Axis is fixed a Cog-Wheel R, 6 Feet Diameter, with 48 Cogs. To this is applied a Trundle, or Pinion, S, of ſix Rounds, or Teeth; and upon the ſame Axis is fixed T, a Cog-Wheel of 51 Cogs, into which the Trundle V, of ſix Rounds, works; on whoſe Axis is a Winch, or Windlaſs, W, by which one Man, with the two Windlaſſes, raiſes or lets down the Wheel as there is Occaſion.

And becauſe the Fulcra of theſe Levers, M N, are in the Axis of the Trundle K, *viz.* at M or X, in what Situation ſoever the Wheel is raiſed or let down, the Cog-Wheel I I, is always equidiſtant from M, and works, or geers truly.

By Means of this Machine the Strength of an ordinary Man will raiſe about fifty Ton Weight.

I, I, is a Cog-Wheel fixed near the End of the great Axis, 8 Feet Diameter, and 44 Cogs working into a Trundle K, of 4½ Foot Diameter, and 20 Rounds, whoſe Axis or Spindle is of Caſt Iron 4 Inches in Diameter, lying in Braſſes at each End, as at X.

Z Z is a quadruple Crank of Caſt Iron, the Metal being 6 Inches ſquare, each of the Necks being turned one Foot from the Center, which is fixed in Braſſes at each End in two Head-ſtocks faſtned down by Caps. One End of this Crank at Y is placed cloſe abutting to the End of the Axle-tree X, where they are at thoſe Ends

ſix

ſix Inches Diameter, each having a Slit in the Ends, where an Iron Wedge is put, one half into the End X, the other half into Y, by Means of which the Axis X turns about the Crank Z Z.

The four Necks of the Crank have each an Iron Spear, or Rod, fixed at their upper Ends to the reſpective Libra, or Lever, *a* 1, 2, 3, 4, within three Foot of the End. Theſe Levers are 24 Feet long, moving on Centers in the Frame *b b b b*; at the End of which, at *c* 1, 2, 3, 4, are jointed four Rods with their forcing Plugs working into *d* 1, 2, 3, 4, four Caſt Iron Cylinders four Feet three quarters long, ſeven Inches Bore above, and nine below where the Valves lie, faſtened by skrewed Flanches, over the four Holes of a hollow Trunk of Caſt Iron, having four Valves in it juſt over *e e e e*, at the joining on of the Bottom of the Barrels, or Cylinders, and at one End a ſucking Pipe and Grate *f*, going into the Water, which ſupplies all the four Cylinders alternately.

From the lower Part of the Cylinders *d* 1, *d* 2, *d* 3, *d* 4, come out Necks turning upward Arch-wiſe, as *g g g g*, whoſe upper Parts are caſt with Flanches to skrew up to the Trunk *h h h h*; which Necks have Bores of 7 Inches Diameter, and Holes in the Trunk above communicating with them, at which Joining are placed four Valves. The Trunk is caſt with four Boſſes, or Protuberances, ſtanding out againſt the Valves to give room for their opening and ſhutting; and on the upper Side are four Holes ſtopped with Plugs, to take out on Occaſion, to cleanſe the Valves. One End of this Trunk is ſtopped by a Plug *i*. To the other, Iron Pipes are joined, as *i* 2, by Flanches, through which

the

the Water is forced up to any Height or Place required.

Beſides theſe four Forcers, there are four more placed at the other Ends of the Libræ, or Levers (not ſhewn here to avoid Confuſion, but to be ſeen on the left Hand) the Rods being fixed at *a* 1, 2, 3, 4, working in four ſuch Cylinders, with their Parts *d d*, &c. *e e*, *f*, *g g*, and *i*, as before deſcribed, ſtanding near *k k*.

At the other End of the Wheel (at B) is placed all the ſame Sort of Work as at the End A, is deſcribed, *viz.*

The Cog-Wheel	I.	The four Levers *ac*, *ac*, &c.	
The Trundle	K.	8 forcing Rods *a d*, *a d*, &c.	
The Spindle	X.	8 Cylinders *d e*, *d e*, &c.	
The Crank	Y, Z.	4 Trunks, ſuch as *e e*, *h h*.	
The ſucking Pipes	*f*.	2 forcing Pipes, as *i*.	

So that one ſingle Wheel works 16 Pumps.

All which Work could not be drawn in one perſpective View, without making it very much confuſed.

A Calculation of the Quantity of Water raiſed by the Engines at London-Bridge.

In the 1ſt Arch next the City is one Wheel with double Work of — — —			16 Forcers.
In the 3d Arch	1ſt Wheel double Work at one End, and ſingle at the other		12
	2d Wheel in the Middle	—	8
	3d Wheel	— —	16
		In all	52 Forcers.

One

One Revolution of a Wheel makes in every Forcer — — } 2⅓ Strokes.

So that one Turn of the 4 Wheels makes 114 Strokes.

When the River is at beſt, the Wheels go ſix times round in a Minute, and but 4½ at middle Water — — } 6

The Number of Strokes in a Minute 684

The Stroke is 2½ Feet, in a 7 Inch Bore, raiſes 3 } Ale Gall.

They raiſe *per* Minute 2052 }

That is, 123120 Gallons = 1954 Hogſheads *per* Hour, and at the Rate of 46896 Hogſheads in a Day, to the Height of 120 Feet.

This is the utmoſt Quantity they can raiſe, ſuppoſing there were no Imperfections or Loſs at all.

But it is certain from the Conſiderations following, that no Engine can raiſe ſo much as will anſwer the Quantity of Water the Cylinder contains in the Length of the Forcer, or Piſton's Motion: For,

Firſt, The opening and ſhutting of the Valves loſe nearly ſo much of that Column, as the Height they riſe and fall.

Secondly, No Leather is ſtrong enough for the Piſton, but there muſt continually ſlip or ſqueeze by ſome Water, when it is raiſed to a great Height; and when the Column is ſhort, it will not preſs the Leather enough to the Cylinder, or Barrel: But eſpecially at the Beginning, or firſt moving of the Piſton, there is ſo little Weight on it, that before the Leather can expand, there is ſome Loſs.

Thirdly, And this Loſs is more or leſs, as the Piſtons are looſer or ſtraighter leathered.

Fourthly, When the Leathers grow too ſoft, they are not capable of ſuſtaining the Pillar to be raiſed.

Fifthly,

Fifthly, If they are leathered very tight, as to loſe no Water, then a great Part of the Engine's Force is deſtroyed by the Friction.

By ſome Experiments I have accurately made, on Engines whoſe Parts are large and excellently performed, they will loſe $\frac{1}{3}$ and ſometimes $\frac{1}{4}$ of the calculated Quantity.

However, the Perfections or Errors of Engines are to be compared together, by the calculated Quantities or Forces; for as they differ in thoſe, they will proportionably differ in their actual Performances.

The Power by which the Wheels are moved.

The Weight of the Pillar of Water on a Forcer 7 Inches Diameter, and 120 Foot high.

$7 \times 7 = 49$ lb The Pounds *Averdupoiſe* in
40 Yards high. [a Yard nearly.
1960 lb on one Forcer.
8 Forcers always lifting.
The whole Weight 15680 lb $= 140$ *Ct.* $= 7$ Tun Weight on the Engine at once.

Then the Crank pulls the *Libra* 3 Feet from the Forcer, and 8,3 Feet from the Center,

7 Tun
× 11.3
8,3)79.1 (9,5 Tun on the Crank.

Tun.
Wallower 2,2)9,5(4,3 on Trundle.
The Spur Wheel 4
The Radius of the great Wheel 10) 17,2 (1,72 Tun.
20
The Force on the Floats 18 *Ct.* 40 lb 34,40 *Ct.*

But to allow for Friction and Velocity, may be reckoned 1 Tun $\frac{1}{2}$.

The

The Ladles or Paddles 14 Foot long, 18 Inches deep, -- } = 22,4 ſquare Feet.
The Fall of Water is ſometimes 2 Feet.

44,8
6 Gall. in a Cub. Ft.
)268,8
10, lb in a Gallon.
112)2688.(24 Hundred.

The Velocity of the Water, 4 Feet in 21‴ of Time.
21‴ — 4 Ft. :: — 60″ : = 685 Feet *per* Minute.
The Velocity of the Wheel = 310 Feet *per* Minute.
Quantity expended on the Wheel, according to the Velocity of the Stream 1433 Hogſheads *per* Second.
But at the Velocity of the Wheel 645 Hogſheads *per* Second.
The Velocity of the Wheel to the Velocity of the Water, as 1 to 22.

Some Obſervations on theſe Water-Works.

Although they may juſtly be eſteemed as good as any in *Europe*, yet are there, as I conceive, ſome Things which might be altered very much for the better.

Firſt, If inſtead of ſixteen Forcers they worked only eight, the Stroke might be five Feet in each Forcer, which would draw a great deal more Water with the ſame Power on the Wheel; for then there would be but half the opening and ſhutting of Valves, conſequently but half that Loſs: And a five Foot Stroke draws above double the Quantity of two Strokes of 2 ½ each, by near ⅕, in regard the Velocity is

double, which is the moſt valuable Conſideration in an Engine, where the Pipes will ſuſtain ſuch Force.

Secondly, The Bores that carry off the Water from the Forcers are too ſmall, there being (nearly) always two Pillars of 7 Inches Diameter, forcing into one Pipe of the ſame Diameter, and $7 \times 7 = 49 + 49 = 98$.

Therefore thoſe Pipes of Conveyance ſhould be near nine Inches Diameter.

The Perfections of the Machine.

The Timber-work is all admirably well performed, and the Compoſition and Contrivance, for Strength and Uſefulneſs, not exceeded by any I have ſeen.

The caſt Iron Cranks are better than wrought ones, by reaſon they are very ſtiff, and will not be ſtrained, but ſooner break; but then they are cheap, and new ones eaſily put in.

The Wedge for putting on or releaſing the Crank and Forcers, is better than the ſliding Sockets commonly uſed.

The forcing Barrels, Trunks, and all their Apparatus, are very curiouſly contrived for putting together, mending, altering or cleanſing, and ſubject to as little Friction as poſſible in that Part.

The Machine for raiſing and falling the Wheels is very good, though but ſeldom uſed, as they tell me; for they will go at almoſt any Depth of Water, and as the Tide turns, the Wheels go the ſame Way with it.

Theſe Machines at *London-Bridge* are far ſuperior to thoſe ſo much famed at *Marly* in *France*, in regard the latter are very ill deſigned in their Cranks, and ſome other Parts.

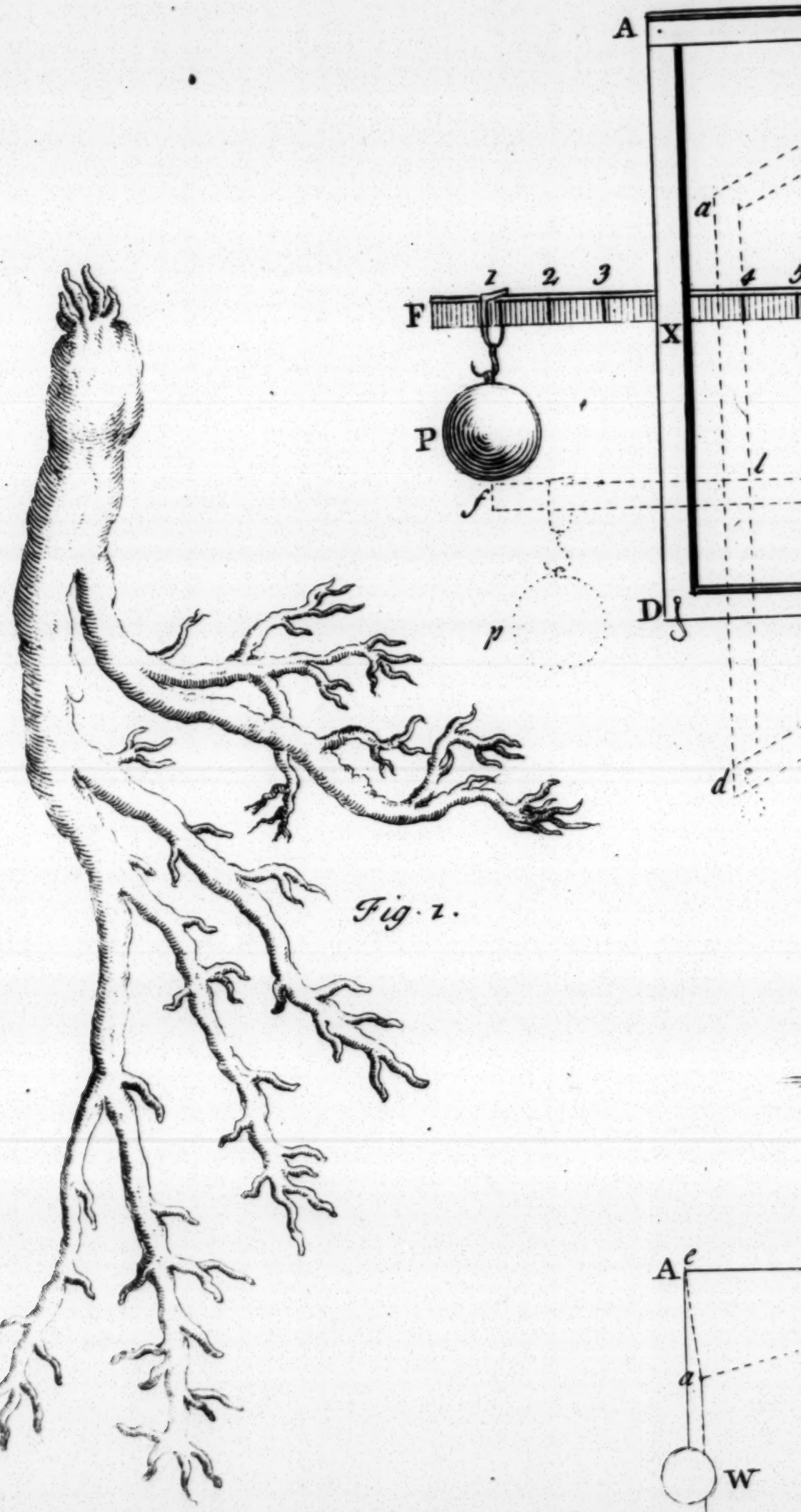
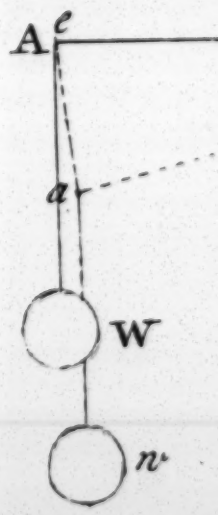


Fig. 1.



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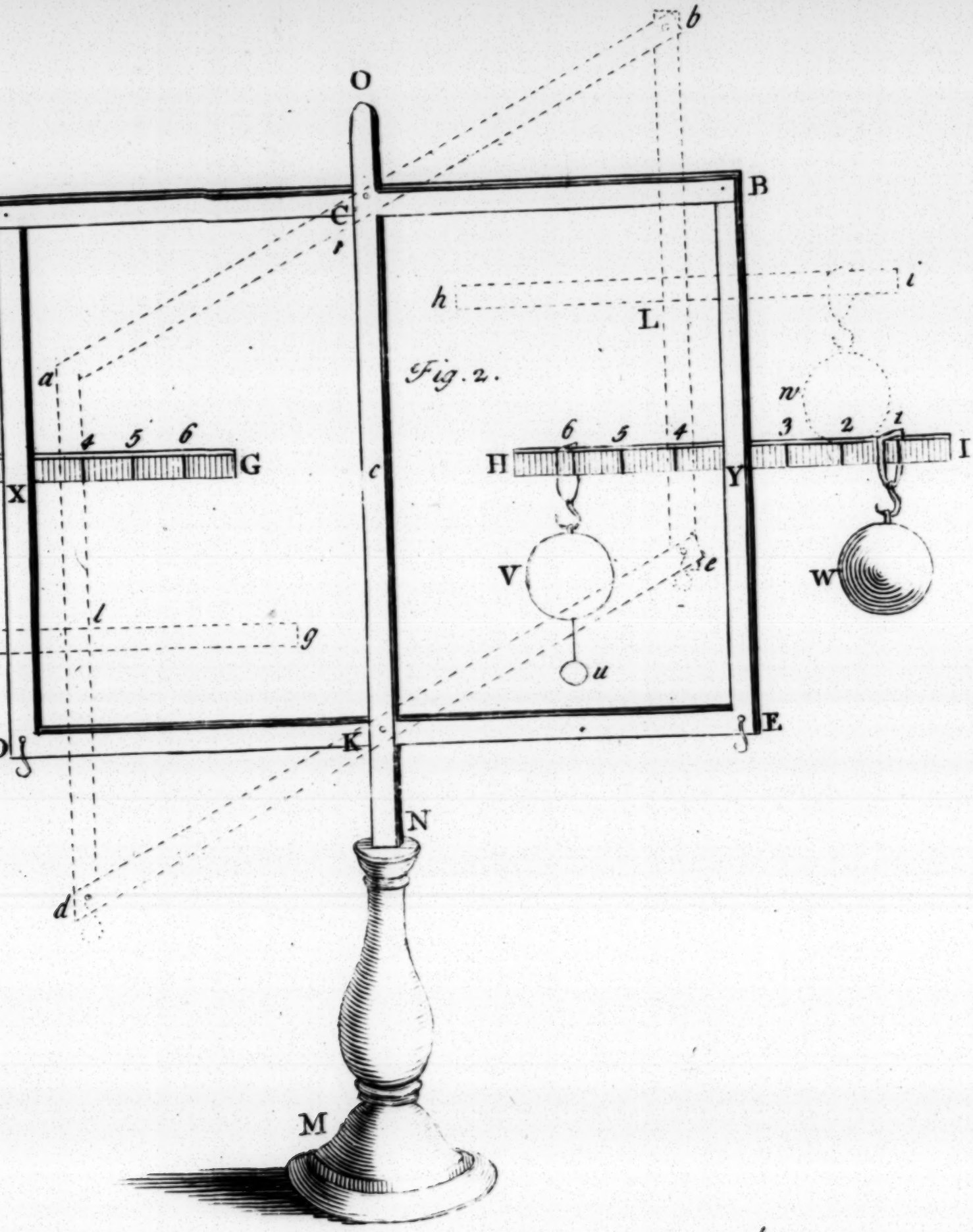


Fig. 2.

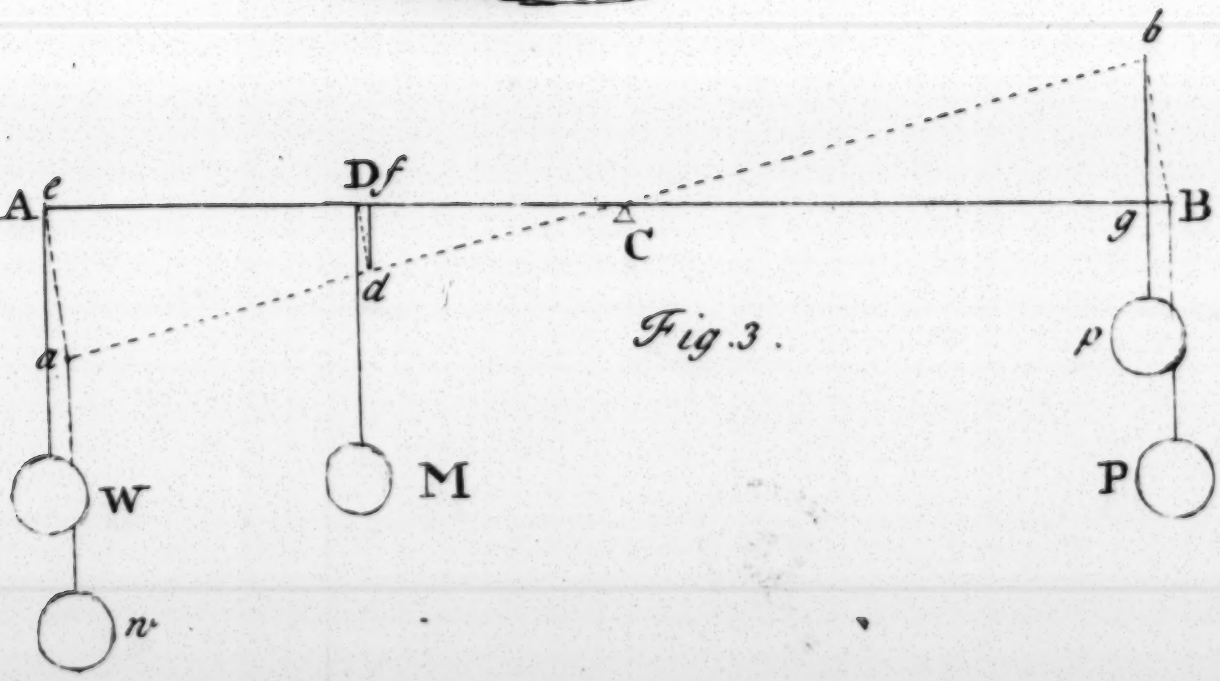


Fig. 3.

III. Epiſtola *continens* Hiſtoriam CALCULI in Veſica *ſponte fracti, & per Urethram feliciter excreti; ad Illuſtrem Generoſiſſimumque Virum* D. FRED. DE THOM, *Sereniſſimo* DUCI BRUNSVICENSI ET LUNEBURGENSI *a Conſiliis*, Oratorem *ejus apud* Potentiſſimum MAGNÆ BRITANNIÆ REGEM, *nec non R. S. S. a* LAURENTIO HEISTERO, *M. D. Prof. Botan. in Acad.* Julia Helmſtadii, *& R. S. S. conſcripta.*

CUM nuper, Vir Præſtantiſſime, qualemcunque apparatum meum & Anatomicum & Chirurgicum & Botanicum, aliaſque res & naturales & præter-naturales inſpicere dignatus ſis, atque inter alia Calculos Veſicæ in homine vivo in veſica ſponte fractos, & per urethram feliciter excretos Tibi demonſtraverim, ſimulque monuerim, hoc quam rariſſime contingere, & propterea ſolutionem calculi in veſica a quam plurimis, atque cum primis etiam ab Anglis recenſioribus impoſſibilem haberi pronunciarique, rogaſti, ut Tibi propediem in Angliam redeunti, fruſtula nonnulla horum calculorum cum brevi quadam hiſtoria ſive deſcriptione darem, quæ Academiæ Regiæ Londinenſi, cujus membrum es digniſſimum, offerres, ut Ipſa inſolitam atque inuſitatam hanc rem videre, ulteriorique ſcrutinio ſubjicere, imo & incredulos rem ita vere actam eſſe perſuadere poſſit. Quare cum præcipue id mihi negotii datum eſſe exiſtimem, ut verum in unaquaque re pateat, atque ſcientiæ arteſque liberales hoc ipſo melius perficiantur atque augeantur,

antur, mitto Tibi hac occaſione nonnulla horum calculorum fruſtula, cum brevi & vera actæ rei hiſtoria.

Eſt nimirum his in terris Brunſvicenſibus in Cœnobio ſeculari, quod *Marienthal* appellatur, & ad horæ circiter diſtantiam ab Helmſtadio, celebri Academiæ Juliæ ſede, ſitum eſt, rerum œconomicarum hujus Cœnobii Præfectus, nomine Widmannus, Vir ſexagenario major, ſed robuſtus & duro vitæ victuſque generi adſuetus, qui per plures annos primo calculo renum ſæpe & vehementer laboravit, eorumque ſenſim magnam copiam, quorum multi Piſi magnitudinem ſuperarunt, per iter urinæ haud ſine magnis doloribus excrevit. Tandem vero quatuor ab hinc annis calculi quoque veſicæ omnia percepit ſymptomata, ita, ut ſæpe non niſi maximis cruciatibus in pubis & perinæi regione perceptis urinam excernere voluerit. Tandem vero anno 1728, poſtquam aliquamdiu variis, ut fieri his in caſibus ſolet, uſus erat remediis, & inprimis Tinctura antinephritica, ut vocant Lipſienſi ſive Rothiana, atque ſimul cereviſiam illam his in regionibus contra calculum celeberrimam, quæ Regiæ Luteræ vulgo **Königs-Lutter**, oppido Brunſvicenſi, coquitur, & quam **Duchſtein** appellant, hancque ob cauſam in loca ſive urbes remotiſſimas devehitur, continuo pro potu ordinario hauſerat, aliquando vehementes inter mingendum dolores, niſum & conſtrictionem in veſica, ſenſumque eo ipſo, ac ſi calculus, ſive calculi in veſica frangerentur ac diſſilirent, percepit, eoque ipſo mox aliquot fruſtula calculi fracti cum lotio dejecit, quæ deinde per plures dies alia ſecuta ſunt, donec tandem ab eis liberatus bene atque pancratice ab omnibus & calculis & calculi doloribus, immunis nunc vivat. Calculos plures una in hoc viro fuiſſe

majores, quam ut integri per urethram tranſire potuiſſent, docent primo diverſus color diverſorum fruſtulorum, quorum nonnulla fuſcum obtinent colorem, alia flaveſcentem ad ſulphuris colorem aliquo modo accedentem, quemadmodum ex his adjectis fruſtulis perſpicere eſt. Deinde id evincunt diverſa horum fruſtulorum ſegmenta: quorum alia majoris alia minoris arcus ſegmenta ſunt. Quod ad numerum attinet fruſtorum, centum circiter ejuſmodi mihi dedit, qualia Tibi, Vir amiciſſime, nunc offero, quæ ex matula collegit. Sancte vero mihi affirmavit, magnam eorum, imo forte adhuc majorem copiam in terram decidiſſe & periiſſe, cum ſæpe ruri, vel in ſylvis, vel in ſtabulis ad res domeſticas curandas degens, mejendi ſtimulo fuerit correptus, atque ſic multa cum urina vel in terram, vel inter herbas aut ſtramina ejecerit. Nonnulla horum fruſtulorum dimidium pollicem æquant, plura minora ſunt, eorumque ſuperficies externa convexa, interna in pleriſque concava, alia nucleum, ut vocant, calculi adhuc exhibent.

Habes igitur, Vir generoſiſſime, exemplum recens & certum, quamplurimis hic & in vicinia notum, calculi veſicæ diſſoluti & excreti ſine lithotomia, ubi Vir, qui eo laboravit, adhuc hodie, dum hæc ſcribo, vivit & valet. Ipſeque Vir eſt honeſtus, antiquæ & germanæ fidei, cui, ut hac in re fallat aut mentiatur, nulla eſt cauſa. Notus eſt morbus olim perpeſſus hominibus quamplurimis; nota jam eſt ejus ſecunda valetudo omnibus, qui eum norunt. Calculorum fractorum ingens copia & facies, quod revera e veſica ſint, rem ulterius confirmat, ita, ut certi eſſe poſſimus, hæc fruſta revera in veſica ejus integros calculos fuiſſe, qui poſtea in veſica, neſcio utrum medicamentorum,

camentorum, an cereviſiæ illius, an naturæ beneficio diſrupti & expulſi ſint. Ex ſegmentis fruſtulorum valde convexis, quæ hic mitto, & quæ adhuc adſervo, judicare licet, vix ullum illorum calculorum nucem moſchatam ſuperaſſe, plures vero minores fuiſſe. Interea tamen ſolutionem calculorum in veſica haud prorſus impoſſibilem eſſe, mihi evincere videntur, licet res forte quam rariſſime contingat. Vale mihique fave.

Dab. Helmſtadii in Academia Julia ipſis Calendis Octobris, M DCC XXX.

IV. *A Letter from the Reverend* William Derham, *D. D. Canon of* Windſor, *and F. R. S. to Sir* Hans Sloane, *Bar^t. Præſ. Coll. Med. & R. S. concerning the* FROST *in* January, 173$\frac{0}{1}$.

THE late Froſt having been almoſt as intenſe as any that hath been for many Years, I ſend you my Account of it; which if you think worth the Cognizance of the *Royal Society*, be pleaſed to impart it to them.

In the *Philoſophical Tranſactions* for *November* and *December*, 1709, Numb. 324, I have given an Account of ſome of the moſt remarkable Froſts that I could find any Relation of; and particularly of that great and, I had almoſt ſaid, univerſal one in 1708, which the Society had very good Hiſtories of from divers Parts, and which, in that *Tranſaction*, I have given an Account of from the Original Papers, which the

the Society was pleaſed to do me the Honour to entruſt me with.

In that *Tranſaction* I have made it very probable, that the greateſt Deſcent of the Spirits in the Thermometer, was on *December* 30, 1708, when my Glaſs was within one Tenth of an Inch as low as it is with artificial Freezing with Snow or Ice and Salt: And in the late Froſt it was almoſt, if not altogether, as low.

The *Freezing-Point* of my Thermometer is 10 Inches (which I call 100 Degrees) above the Globe of Spirits; and the moſt intenſe Freezing (according to the Methods I have mentioned in that *Tranſaction*) is juſt at, or very little within the Ball. And on *January* 30, about Sun-riſing, the Thermometer was but an Inch, or 10 Degrees above the Point of extreme Freezing; and on *February* 3, at only half an Inch, or 5 Degrees. And conſidering that the Thermometer I obſerved with in 1708, was leſs accurate, and differently graduated from that which I now have, I am apt to think, that the Froſt on *February* 3 laſt, was altogether as intenſe as that on *December* 30, 1708. For although a Frigorifick Mixture ſunk the Spirits but one Tenth lower in the old Thermometer, and about 5 or 6 Tenths in that I now obſerve with, yet I take the Difference to be little, or none at all, by reaſon of the Tenderneſs of the new above the old Glaſs.

And this Degree of Cold I take to be as exceſſive as in any of the Years mentioned in the ſaid *Tranſaction*; yea, any of the Years, when the *Thames* at *London* was frozen over: I am ſure colder than in the Year 1716,

when that River was frozen over for ſeveral Miles, and Booths andStreets were made on the Ice, an Ox roaſted thereon, *&c.* For the loweſt Point of Freezing in 1716, was on *January* 7, when the Spirits fell to 35 Degrees only of the Glaſs I now make uſe: But the true Cauſe of the freezing of the *Thames* that Year was not barely the Exceſs of the Cold, but the long Continuance of it: Which was alſo the principal Cauſe of thoſe remarkable Congelations of that River in 1683 and 1708, when I ſaw Coaches driven over the Ice, large Fires made on it, *&c.* I am, with great Reſpect,

Honoured SIR,

Upminſter, Feb. 13th, 173$\frac{0}{1}$.

Yours,

WILLIAM DERHAM.

V. *A Letter to* Cromwell Mortimer, *M. D. Secr. R. S. containing ſeveral Experiments concerning* Electricity; *by Mr.* Stephen Gray.

SIR,

IN the Year 1729 I communicated to Dr. *Deſaguliers*, and ſome other Gentlemen, a Diſcovery I had then lately made, ſhewing that the Electrick Vertue of a Glaſs Tube may be conveyed to any other Bodies, ſo as to give them the ſame Property of attracting

ing and repelling light Bodies, as the Tube does, when excited by rubbing; that this attractive Vertue might be carried to Bodies that were many Feet distant from the Tube. On *May* the 1st Dr *Desaguliers* made a Report of the Experiments he had seen, to the *Royal Society*; I then promised to communicate a more particular Account of these Experiments to the *Society*; but as I was the next Day to go into the Country, where I knew that I should have the Opportunity of carrying on the Experiments much farther than I had yet done, for want of Room in my Chamber, which was not large enough for carrying on several other Experiments I had in View; I was willing, as I had begun the Discovery, to carry it on as much farther as I could, before I communicated it to the *Royal Society*, which I now humbly offer to their Consideration.

In *February* 172⅔, I repeated some of the Experiments I had formerly made, in the first Discovery of an Electrical Attraction in many Bodies, not before known to have that Property, which I communicated to the *Royal Society*. An Account of those Experiments is given in the *Philosophical Transactions*, N° 366. I made several Attempts on the Metals, to see whether they might not be made attractive by the same Method as other Bodies were, *viz.* by heating, rubbing and hammering, but without any Success: I then resolved to procure me a large Flint-Glass Tube, to see if I could make any farther Discovery with it, having called to Mind a Suspicion which some Years ago I had, that as the Tube communicated a Light to Bodies, when it was rubbed in the Dark, whether it might not at the same Time communicate an Electricity to them, though

I never till now tried the Experiment, not imagining the Tube could have ſo great and wonderful an Influence, as to cauſe them to attract with ſo much Force, or that the Attraction would be carried to ſuch prodigious Diſtances, as will be found in the Sequel of this Diſcourſe.

Before I proceed to the Experiments, it may be neceſſary to give a Deſcription of the Tube: Its Length is three Feet five Inches, and near one Inch two Tenths in Diameter: I give the mean Dimenſions, the Tube being larger at each End than in the Middle, the Bore about one Inch. To each End I fitted a Cork, to keep the Duſt out when the Tube was not in uſe.

The firſt Experiment I made, was to ſee if I could find any Difference in its Attraction, when the Tube was ſtopped at both Ends by the Corks, or when left open, but could perceive no ſenſible Difference; but upon holding a Down-Feather over againſt the upper End of the Tube, I found that it would go to the Cork, being attracted and repelled by it, as by the Tube when it had been excited by rubbing. I then held the Feather over againſt the flat End of the Cork, which attracted and repelled many Times together; at which I was much ſurprized, and concluded that there was certainly an attractive Vertue communicated to the Cork by the excited Tube.

Having by me an Ivory Ball of about one Inch three Tenths Diameter, with a Hole through it, this I fixed upon a Fir-Stick about four Inches long, thruſting the other End into the Cork, and upon rubbing the Tube, found that the Ball attracted and repelled the Feather with more Vigour than the Cork had done,

repeat-

a Piece of Lead; then with larger Quantities of Metal, ſuſpending them on the Tube by Packthread. Here I made uſe of a Fire-Shovel, Tongs, and Iron Poker, a Copper Tea-Kettle, which ſucceeded the ſame, whether empty, or full of either cold or hot Water; a Silver Pint Pot; all which were ſtrongly Electrical, attracting the Leaf-Braſs to the Hight of ſeveral Inches. After I had found that the Metals were thus Electrical, I went on to make Trials on other Bodies, as Flint-Stone, Sand-Stone, Load-Stone, Bricks, Tiles, Chalk; and then on ſeveral vegetable Subſtances, as well green as dry, and found that they had all of them an Electrick Vertue communicated to them, either by being ſuſpended on the Tube by a Line, or fixed on the End of it by the Method above-mentioned.

I next proceeded to try at what greater Diſtances the Electrick Vertue might be carried, and having by me Part of a hollow walking Cane, which I ſuppoſe was Part of a Fiſhing-Rod, two Feet ſeven Inches long; I cut the great End of it, to fit it into the Bore of the Tube, into which it went about five Inches; then when the Cane was put into the End of the Tube, and this excited, the Cane drew the Leaf-Braſs to the Hight of more than two Inches, as did alſo the Ivory Ball, when by a Cork and Stick it had been fixed to the End of the Cane. A ſolid Cane had the ſame Effect, when inſerted in the Tube after the ſame Manner as the hollow one had been. I then took the two upper Joints of a large Fiſhing-Rod, the one of *Spaniſh* Cane, the other partly Wood and the upper End Whale-bone, which, together with the Tube, made a Length of more than fourteen Feet. Upon the leſſer

End

repeating its Attractions and Repulsions for many Times together: I then fixed the Ball on longer Sticks, first upon one of eight Inches, and afterwards upon one of twenty-four Inches long, and found the Effect the same. Then I made use of first Iron, and then Brass Wire, to fix the Ball on, inserting the other End of the Wire in the Cork, as before, and found that the Attraction was the same as when the Fir-Sticks were made use of, and that when the Feather was held over against any Part of the Wire, it was attracted by it; but though it was then nearer the Tube, yet its Attraction was not so strong as that of the Ball. When the Wire of two or three Feet long was used, its Vibrations, caused by rubbing the Tube, made it somewhat troublesome to be managed: This put me upon thinking, whether if the Ball was hung by a Packthread, and suspended by a Loop on the Tube, the Electricity would not be carried down the Line to the Ball: I found it to succeed accordingly; for upon suspending the Ball on the Tube by a Packthread about three Feet long, when the Tube had been excited by rubbing, the Ivory Ball attracted and repelled the Leaf-Brass, over which it was held, as freely as it had done, when it was suspended on Sticks or Wire; as did also a Ball of Cork, and another of Lead that weighed one Pound and a quarter.

After I had found that the several Bodies above-mentioned had an Electricity communicated to them, I then went on to see upon what other Bodies the Tube would have the same Effect, beginning with the Metals, suspending them on the Tube by the Method above-mentioned; first in small Pieces, as with a Guinea, a Shilling, a Half-penny, a Piece of Block-Tin,

a

End of the Whale-bone was fixed a Ball of Cork of about an Inch and quarter Diameter; then the great End of the Rod being inſerted in the Tube, the Leaf-Braſs laid on the Table, and the Tube excited, the Ball attracted the Leaf-Braſs to the Hight of about three Inches by Eſtimation. With ſeveral Pieces of *Spaniſh* Cane and Fir-Sticks I afterwards made a Rod, which, together with the Tube, was ſomewhat more than eighteen Feet long, which was the greateſt Length I could conveniently uſe in my Chamber, and found the Attraction very nearly, if not altogether as ſtrong, as when the Ball was placed on ſhorter Rods. Thus far I proceeded before I went into the Country, which I did the 2d of *May*, 1729, taking with me ſeveral Glaſs Canes, and ſuch other Materials I thought would be neceſſary, and could not well be procured there. I ſhall now give an Account of the Experiments I then made, ſome of which were made at *Norton-Court* near *Feverſham* in *Kent*, at my honoured Friend's *John Godfrey*'s, Eſq; the other at *Otterden-Place*, at my honoured Friend's *Granvil Wheler*'s, Eſq; a worthy Member of the *Royal Society*, with whom I have had the Honour to be lately acquainted. I ſhall ſet down each Experiment in the Order of the Time and Place they were made, as I find it in my Notes.

The firſt Experiment was made at *Norton-Court*, *May* 14th, 1729, between ſix and ſeven o'Clock in the Evening. Having provided a Rod of about twenty-four Feet, that conſiſted of a Fir-Pole, of Cane, and the Top of Reed, upon the End of which the Ball of Cork was placed, and the great End of the Rod put into the Tube about ſeven or eight Inches; then the Leaf-

Leaf-Braſs being laid down, and the Tube rubbed, the Ball attracted and repelled the Leaf-Braſs with Vigour; ſo that it was not at all to be doubted, but with a longer Pole the Electricity would have been carried much farther.

May the 16th, I made a Rod thirty-two Feet long, including the Tube; the bigger Part of it was a Fir-Staff about ſix Feet and a half long, the reſt was of Cane, and Reed for the top Part of it. All Things being prepared, as before, the Effect was the ſame as in the laſt Experiment, only the Pole bending ſo much, and vibrating by rubbing the Tube, made it more troubleſome to manage the Experiment. This put me upon making the following Experiments.

May the 19th, about ſix in the Morning, the Ivory Ball being ſuſpended on the Tube, by a Line of Pack-thread twenty-ſix Feet long, which was the Hight, I ſtood at in the Balcony, from the Court where he ſtood, that held the Board with the Leaf-Braſs on it; then the Tube being rubbed, attracted the Leaf-Braſs to the Hight of near two Inches, as he that aſſiſted informed me. This was repeated with the Cork Ball with the ſame Succeſs.

May the 31ſt, in the Morning, to a Pole of eighteen Feet there was tied a Line of thirty-four Feet in Length; ſo that the Pole and Line together were fifty-two Feet. With the Pole and Tube I ſtood in the Balcony, the Aſſiſtant below in the Court, where he held the Board with the Leaf-Braſs on it; then the Tube being excited as uſual, the Electrick Vertue paſſed from the Tube up the Pole, and down the Line to the Ivory Ball, which attracted the Leaf-Braſs, and as the Ball

paſſed

paſſed over it in its Vibrations, the Leaf-Braſs would follow it, till it was carried off the Board: But theſe Experiments are difficult to make in the open Air, the leaſt Wind that is ſtirring, carrying away the Leaf-Braſs.

Some Time after I made ſeveral Attempts to carry the Electrick Vertue in a Line horizontally, ſince I had not the Opportunity here of carrying it from greater Hights perpendicularly, but without Succeſs, for want of then making uſe of proper Materials, as will appear from what follows. The firſt Method I made Trial of, was by making a Loop at each End of a Line, and hanging it on a Nail drove into a Beam, the other End hanging downwards, through the Loop at this End the Line with the Ivory Ball was put; the other End of this Line was by a Loop hung on the Tube; ſo that that Part of the Line next the Ball hung Perpendicular, the reſt of the Line Horizontal: Then the Leaf-Braſs being laid under the Ball, and the Tube rubbed, yet not the leaſt Sign of Attraction was perceived. Upon this I concluded, that when the Electrick Vertue came to the Loop that was ſuſpended on the Beam, it went up the ſame to the Beam; ſo that none, or very little of it at leaſt, came down to the Ball, which was afterwards verified, as will appear by the Experiments that will be mentioned hereafter. Upon this I gave over making any farther Attempts of carrying the Electricity horizontally, deſigning at my Return to *London*, if I could get Aſſiſtance, to have tried the Experiment from the Top of the Cupola of St. *Paul*'s, not doubting but the Electrick Attraction

would be carried down perpendicular, from thence to the Ground.

June the 30th, 1729, I went to *Otterden-Place*, to wait on Mr. *Wheler*, carrying with me a ſmall ſolid Glaſs Cane of about eleven Inches long, and ſeven eighth Parts of an Inch in Diameter, with ſome other requiſite Materials, deſigning only to give Mr. *Wheler* a Specimen of my Experiments. The firſt was from the Window in the Long Gallery that opened into the Hall, the Hight about ſixteen Feet; the next from the Battlements of the Houſe down into the fore Court, twenty-nine Feet; then from the Clock-Turret to the Ground, which was thirty-four Feet, this being the greateſt Hight we could come at; and notwithſtanding the Smallneſs of the Cane, the Leaf-Braſs was attracted and repelled beyond what I expected. As we had no greater Hights here, Mr. *Wheler* was deſirous to try whether we could not carry the Electrick Vertue horizontally. I then told him of the Attempt I had made with that Deſign, but without Succeſs, telling him the Method and Materials made uſe of, as mentioned above. He then propoſed a Silk Line to ſupport the Line, by which the Electrick Vertue was to paſs. I told him it might do better upon the Account of its Smallneſs; ſo that there would be leſs Vertue carried from the Line of Communication, with which, together with the apt Method Mr. *Wheler* contrived, and with the great Pains he took himſelf, and the Aſſiſtance of his Servants, we ſucceeded far beyond our Expectation.

The firſt Experiment was made in the matted Gallery *July* 2, 1729, about Ten in the Morning. About four

Feet

Feet from the End of the Gallery there was a croſs Line that was fixed by its Ends to each Side of the Gallery by two Nails; the middle Part of the Line was Silk, the reſt at each End Packthread; then the Line to which the Ivory Ball was hung, and by which the Electrick Vertue was to be conveyed to it from the Tube, being eighty Feet and a half in Length, was laid on the croſs Silk Line, ſo as that the Ball hung about nine Feet below it: Then the other End of the Line was by a Loop ſuſpended on the Glaſs Cane, and the Leaf-Braſs held under the Ball on a Piece of white Paper; when the Tube being rubbed, the Ball attracted the Leaf-Braſs, and kept it ſuſpended on it for ſome Time.

This Experiment ſucceeding ſo well, and the Gallery not permitting us to go any farther in one Length, Mr. *Wheler* thought of another Expedient, by which we might encreaſe the Length of our Line, which was by putting up another croſs Line near the other End of the Gallery; and over the Silk Part of both the Lines there was laid a Line that was long enough to be returned to the other End, where the Ball hung; and though now both Ends of the Line were at the ſame End of the Gallery, yet Care was taken that the Tube was far enough off from having any Influence upon the Leaf-Braſs, except what paſſed by the Line of Communication: Then the Cane being rubbed, and the Leaf-Braſs held under the Ivory Ball, the Electrick Vertue paſſed by the Line of Communication to the other End of the Gallery, and returned back again to the Ivory Ball, which attracted the Leaf-Braſs, and ſuſpended it as before. The whole Length of the Line was 147 Feet.

We then thought of trying whether the Attraction would not be ſtronger without doubling or returning the Line, which we found Means of doing in the Barn, where we had a Line of 124 Feet long, fourteen Feet of which hung perpendicular from the Silk Line; and now the Attraction was, as we then concluded, ſtronger than when the Line was returned, as in the matted Gallery.

July 3, having now brought with me the great Glaſs Tube, between Ten and Eleven in the Morning we went again into the Barn, carrying with us the ſolid Cane, and repeated the laſt mentioned Experiment with both the Tube and Cane; but the Attraction was not ſo ſtrong as in the preceding Evening, nor was there ſo great a Difference in the Attraction communicated by the ſolid Cane and Glaſs Tube, as one would have expected, conſidering the Difference of their Lengths and Diameters.

We then proceeded farther, by adding ſo much more Line as would make a Return to the other End of the Barn, the whole Length of the Line being now 293 Feet; and though the Line was ſo much lengthened, we found no perceivable Difference in the Attraction, the Ball attracting as ſtrongly as before. This encouraged us to add another Return; but upon beginning to rub the Tube, our Silk Lines broke, being not ſtrong enough to bear the Weight of the Line, when ſhaken by the Motion given it by rubbing the Tube. Upon this, having brought with me both Braſs and Iron Wire, inſtead of the Silk we put up ſmall Iron Wire; but this was too weak to bear the Weight of the Line. We then took Braſs Wire of a ſomewhat larger Size

than

than that of Iron. This ſupported our Line of Communication; but though the Tube was well rubbed, yet there was not the leaſt Motion or Attraction given by the Ball, neither with the great Tube, which we made uſe of when we found the ſmall ſolid Cane to be ineffectual: By which we were now convinced, that the Succeſs we had before, depended upon the Lines that ſupported the Line of Communication, being Silk, and not upon their being ſmall, as before Trial I imagined it might be; the ſame Effect happening here as it did when the Line that is to convey the Electrick Vertue is ſupported by Packthread; *viz.* that when the Effluvia come to the Wire or Packthread that ſupports the Line, it paſſes by them to the Timber, to which each End of them is fixed, and ſo goes no farther forward in the Line that is to carry it to the Ivory Ball.

Finding that our Silk Threads were too weak to bear many Returns of Line, Mr. *Wheler* thought of another Way of managing them, ſo that fewer Returns might be upon each Silk Line; which was by placing two other croſs Lines ſome Feet below the upper ones; ſo that every other Turn of Line was ſuſpended by the lower croſs Line. By this Means there was but half the Weight of Line upon each Silk, of what there was when only two croſs Lines were made uſe of as before. By this Contrivance, we could add a much greater Length of Line, without Danger of breaking our Silk. We then put up a Line that was 666 Feet in Length, by eight Returns: Then the Leaf-Braſs being held on a Piece of white Paper under the Ivory Ball, and the Tube, with the other End of the Line

ſuſpended on it, being rubbed for ſome Time, the Leaf-Braſs was attracted as manifeſtly as it had been with much ſhorter Lines. We then repeated the Experiment with the little ſhort ſolid Cane, and found there was ſomewhat of an Attraction, but not near ſo great as with the large Tube.

Though the going and returning of the Electrick Effluvia was very ſurpriſing, yet we were willing to try how far the attractive Vertue might be carried in a continued right Line; the Method of doing which was thus: That End of the Line where the Attraction was to be made, was ſuſpended on a Silk Line that was fixed croſs the Garret Window on the North-ſide of the Houſe, which was by Eſtimation about forty Feet high; at about an hundred Feet from hence two Rods or Poles of about ten Feet long, and at two Feet diſtance from each other, were drove into the Ground, ſo as that they ſtood nearly perpendicular. Theſe were in the great Garden. Beyond theſe, in the great Field, that is ſeparated from the Garden by a deep Foſs, about the ſame Diſtance from the firſt, were another Pair of Poles fixed; then four others at a like Diſtance. Upon the Ends of theſe Poles were tied the croſs Lines of Silk, to ſupport the Line of Communication, which being laid on the Silk Lines, the Ivory Ball hanging in the Garret Window, and the other End of the Line being hung by a Loop on the Tube, the Leaf-Braſs was held under the Ball, and after the Tube had been rubbed for ſome Time, they called to me to let me know that there was an Attraction of the Leaf-Braſs. This was ſeveral Times repeated with Succeſs; then Mr. *Wheler* came into the Field, and rubbed the Tube himſelf,

himſelf, that I might ſee there was an Attraction; which I ſaw, thdugh I perceived it not to be ſo ſtrong, as when the Attraction was carried by a longer Line, by returning it, as in the Experiments above-mentioned. The Length of the Line was 650 Feet. This was ſeveral Times repeated, but the Experiment being made in the Evening, at length the Dew began to fall. We began about Seven o'Clock, or ſome little Time after, but before Eight the Attraction ceaſed: But whether this was cauſed by the Dew falling, or by my being very hot, we could not poſitively ſay, but I rather impute it to the latter. This Experiment was made *July* 14, 1729.

Note, That though we call the carrying the Electrick Vertue by the Lines in this Poſition Horizontal, you are not to underſtand it in a ſtrict Senſe, as may be eaſily perceived by the Deſcription of the Method; and That as the Line ſwagged down much below the Silk Lines that ſupported it, in the middle Part between thoſe Lines, it was ſome Feet longer than the Diſtance of the Poles.

Some Days after this Experiment was repeated from the Turret Cloſet Window, when the Line was 765 Feet, and the Attraction was no leſs perceivable than in the Experiment above-mentioned.

More Experiments made at Mr. Wheler's, *ſhewing that large Surfaces may be impregnated with Electrick Effluvia.*

A large Map of the World, that had twenty-ſeven ſquare Feet in it; a Table-Cloth containing fifty-nine ſquare Feet; theſe ſuſpended on the Tube by Pack-

Packthreads, became Electrical. An Umbrello, ſuſpended by a Packthread tied to the Handle of it, became ſtrongly Electrical.

An Experiment propoſed by Mr. Wheler, *to ſee whether the Electrick Vertue would be any Way hindred by the magnetical Effluvia of a Loadſtone.*

This had a ſmall Key hung by one of its arming Irons, and the Stone, together with the Key hung to it, were ſuſpended on the Tube by a Packthread; then the Tube being rubbed, the Key and Stone both attracted the Leaf-Braſs, the Attraction being the ſame as that of other Bodies.

An Experiment made to ſhew that the Electrick Vertue is carried ſeveral Ways at the ſame Time, and may be conveyed to conſiderable Diſtances.

There was made three Stands, each compoſed of two upright Pieces of Fir, fixed perpendicular, near the Ends of a long ſquare Board, diſtant from each other near a Foot and a half. Upon the Tops of theſe were tied Threads of Silk to ſupport the Lines of Communication with the Tube and the attracting Bodies. One of theſe Stands was placed in the great Parlour, near the farther End; another in the little Parlour, and a third in the Hall, which was between the two Parlours: As the other two were one of them to the right, the other to the left Hand, this laſt was placed near the Hall-Window forwards; the two firſt were about fifty Feet, the other about twenty Feet from the Place

where

where the Tube was held ; then there were taken three ſmall ſquare Pieces of Wood, that were tied to three Lines of Packthread : Theſe were of about the Lengths above-mentioned. They were laid on the Silk Lines, and by Loops at the other Ends were ſuſpended on the Tube; then the Leaf-Braſs being held under the Pieces of Wood, and the Tube rubbed, they all of them attracted the Leaf-Braſs at the ſame Time. Some Time after, in my Abſence, Mr. *Wheler* tried a red hot Poker, and found that the Attraction was the ſame as when cold. He alſo ſuſpended a live Chick upon the Tube, by the Legs, and found that the Breaſt of the Chick was ſtrongly Electrical.

At Mr. Godfrey's *I made the following Experiments; ſhewing that the* Electrick Vertue *may be carried from the Tube, without touching the Line of Communication, by only being held near it.*

The firſt of theſe Experiments was made the 5th of *Auguſt*, 1729. I ſhall here mention ſome of the moſt conſiderable ones; but as I did not always ſet down the Day of the Month, ſome of them may not be related in the Order of Time they were made; nor did I always mention the Length of the Lines, theſe not being thought to be abſolutely neceſſary.

I took a Piece of a Hair-Line, ſuch as Linnen-Cloaths are dried on, of about eleven Feet in Length; which, by a Loop at the upper End of it, was ſuſpended on a Nail, that was drove into one of the Rafters in the Garret, and had at its lower End

a leaden Weight of fourteen Pounds hung to it by an Iron Ring: then the Leaf-Braſs was laid under the Weight, and the Tube rubbed, and being held near the Line without touching it, the Lead-Weight attracted and repelled the Leaf-Braſs for ſeveral times together, to the Hight of at leaſt three, if not four Inches. If the Tube was held three or four Feet above the Weight, there would be an Attraction; but if it were held higher up, ſo as to be near the Rafter where the Weight was hung by the Hair-Line, there would be no Attraction.

An Experiment, ſhewing that the Electrick Vertue *may be carried ſeveral Ways at the ſame Time, by a Line of Communication, without touching the ſaid Line.*

There were taken two Hair-Lines, of between four and five Feet long; to each of theſe was tied a ſquare Piece of Cork, by Packthread; the Lines were ſuſpended by Loops at their upper Ends, upon two Nails; near the lower Ends there was tied to the Hair-Lines a Piece ef Packthread, by which there was a Communication between the two Hair-Lines; then the Leaf-Braſs laid under the Corks, the Tube being rubbed, and held near one of the Lines, both the Corks attracted; but that which was fartheſt, much ſtronger than that, near which the Tube was held. About the Middle of the Line of Communication they both drew with equal Force.

Some Time after, at Mr. Wheler's, *we made the following Experiment, in order to try whether the* Electrick Attraction *be proportional to the Quantity of Matter in Bodies.*

There were made two Cubes of Oak, of about ſix Inches Square, the one ſolid, the other hollow: Theſe were ſuſpended by two Hair-Lines, nearly after the ſame Manner as in the Experiment above-mentioned; the Diſtance of the Cubes from each other, was by Eſtimation, about fourteen or fifteen Feet; the Line of Communication being tied to each Hair-Line, and the Leaf-Braſs placed under the Cubes, the Tube was rubbed and held over the Middle of the Line, and as near as could be gueſſed, at equal Diſtances from the Cubes, when both of them attracted and repelled the Leaf-Braſs at the ſame Time, and to the ſame Hight; ſo that there ſeemed to be no more Attraction in the ſolid than in the hollow Cube; yet I am apt to think that the Electrick Effluvia paſs through all the interior Parts of the ſolid Cube, though no Part but the Surface attracts; for from ſeveral Experiments it appears, that if any other Body touches that which attracts, its Attraction ceaſes till that Body be removed, and the other be again excited by the Tube.

A Continuation of the Experiments made at Mr. Godfrey's.

I next went on with an Experiment, to ſee if the Electrick Vertue might not be conveyed to a Rod, without inſerting it into the Bore of the Tube, or without touching the Rod, which I found to ſucceed,

by ſuſpending the Rod either by Lines of Silk, or by Pieces of Horſe-Hair Fiſhing-Lines, placing a Ball of Cork on the leſſer End of the Rod.

Auguſt 13, I took a large Pole that was twenty-ſeven Feet long, two Inches and a half Diameter at the great End, and at the leſſer about half an Inch: It was that Sort of Wood they call Horſe-Beech, with the Rind on. This was ſuſpended by two Hair-Lines of about four Feet and a half in Length; the firſt Line was about two Feet from the great End of the Pole, the other about eight Feet from the leſſer End; ſo that the Pole hung horizontal. At the little End of the Pole was hung a Ball of Cork about an Inch and a half Diameter by a Packthread about a Foot long, and a ſmall leaden Ball upon the Cork to keep the Packthread extended: Then the Leaf-Braſs being laid under the Cork, the Tube rubbed and held near the great End of the Pole, the Cork Ball drew the Leaf-Braſs ſtrongly to the Hight of an Inch, if not more: Then the Leaf-Braſs being held under ſeveral Parts of the Pole, it was attracted by it, as Mr. *Godfrey* obſerved, but not near ſo ſtrongly as the Cork did.

About the Beginning of September *I made the following Experiment, which ſhews that the* Electrick Effluvia *will be carried in a* Circle, *and be communicated from one* Circle *to another.*

There was taken a Hoop of about two Feet two Inches Diameter; this I ſuſpended by a Hair-Line upon a Nail drove into a Beam; the Line was about four Feet long; then the Leaf-Braſs being laid under the Hoop, the Tube was rubbed, and held within

within the Hoop, near the upper Side of it, without touching it by ſeveral Inches: Then the lower Part of the Hoop attracted and repelled the Leaf-Braſs ſtrongly; but when held near the lower Part, there was very little, if any Attraction. If the Tube was held near the outſide of the Hoop, it attracted; but ſtrongeſt, when at the ſame Time it was held near the Knot of the Hair-Line the Hoop was ſuſpended by. To this Hoop there was tied a leſſer Hoop of about a Foot and a half Diameter: It was tied to it by Packthread, ſo as to hang below it about two Inches; they were ſuſpended together by the Hair-Line; then the Leaf-Braſs and the Tube being prepared, as hath been mentioned before, the Tube being held near the upper Hoop, the lower Part of the lower Hoop attracted ſtrongly, and when held near the upper Part of the lower Hoop, but very weakly; but when held near the lower Part of the lower Hoop, there was no Attraction.

On the 15*th of* September *I made the following Experiment, which ſhews, that the* Electrick Effluvia *have the ſame Effect in a* Circle, *when its Poſition is horizontal.*

I took a large Hoop, of ſomewhat more than three Feet Diameter, and Breadth of about two Inches and a half; to this was tied at near equal Diſtances, four Lines: They were what they call Twine, which is of three Threads of Packthread twiſted together, each about two Feet eight Inches long. Theſe were tied with their Ends together to a Hair-Line of about two Feet and a half long, by which the Hoop was hung

hung on a Nail, as in the other Experiments, ſo that the Hoop hung now in an horizontal Poſition: Then the Leaf-Braſs being laid under the Edge of the Hoop, at between two and three Inches below it, the Tube being rubbed, and held between the Cords without touching them, the Leaf-Braſs was attracted and repelled for ſeveral times together; but when held near the outſide of the Hoop, oppoſite to that Part where the Leaf-Braſs lay, the Attraction was much ſtronger.

About the latter End of Autumn, and the Beginning of the Winter in 1729, I reſumed my Enquiry after other Electrick Bodies, to ſee what Addition I could make to the Catalogue of thoſe mentioned above, in Pages 21, 22, and found many more that have the ſame Property, and may be excited to attract by the ſame Method. As for Inſtance, the dry withered Leaves of Reeds and Flags, Graſs and Corn, both Leaves and Straw; the Leaves of Trees, as thoſe of the Laurel, the Oak, the Walnut, the Cheſnut, Hazle-nut, Apple and Pear-tree Leaves; ſo that we may conclude, that the Leaves of all Vegetables have this Attractive Vertue.

I ſhall now give an Account of the Experiments made at my Chamber in the Year 1730.

March the 23d, I diſſolved Soap in the *Thames*-Water, then I ſuſpended a Tobacco-Pipe by a Hair-Line, ſo as that it hung nearly horizontal, with the Mouth of the Bowl downwards; then having dipped it in the Soap-Liquor, and blown a Bubble, the Leaf-Braſs laid on a Stand under it, the Tube being rubbed, the Braſs was attracted by the Bubble, when the

the Tube was held near the Hair-Line. Then I repeated the Expriment with another Bubble, holding the Tube near the little End of the Pipe, and the Attraction was now much greater, the Leaf-Braſs being attracted to the Higlit of near two Inches.

March the 25th, I repeated this Experiment after a ſomewhat different Manner: The Pipe was now ſuſpended by two Lines of white ſewing Silk, of about five Feet and a half long; theſe were hung upon two Nails drove into the Beam of my Chamber, diſtant from each other about a Foot, by Loops at the other End of the Lines, by which the Pipe was ſuſpended; then the Bubble being blown, by holding the Tube to the little End of the Pipe, the Bubble attracted the Leaf-Braſs to the Hight of near four Inches. This Experiment was made to ſee whether fluid Bodies would not have an Electricity communicated to them.

April 8, 1730, I made the following Experiment on a Boy between eight and nine Years of Age. His Weight, with his Cloaths on, was forty-ſeven Pounds ten Ounces. I ſuſpended him in a horizontal Poſition, by two Hair-Lines, ſuch as Cloaths are dried on: They were about thirteen Feet long, with Loops at each End. There was drove into the Beam of my Chamber, which was a Foot thick, a Pair of Hooks oppoſite to each other, and two Feet from theſe another Pair in the ſame manner. Upon theſe Hooks the Lines were hung by their Loops, ſo as to be in the Manner of two Swings, the lower Parts hanging within about two Feet of the Floor of the Room: Then the Boy was laid on theſe Lines with his Face downwards, one of the Lines being put under his Breaſt, the other

under his Thighs: Then the Leaf-Braſs was laid on a Stand, which was a round Board of a Foot Diameter, with white Paper paſted on it, ſupported on a Pedeſtal of a Foot in Hight, which I often made uſe of in other Experiments, though not till now mentioned: Upon the Tube's being rubbed, and held near his Feet, without touching them, the Leaf-Braſs was attracted by the Boy's Face with much Vigour, ſo as to riſe to the Hight of eight, and ſometimes ten Inches. I put a great many Pieces on the Board together, and almoſt all of them came up together at the ſame Time. Then the Boy was laid with his Face upwards, and the hind Part of his Head, which had ſhort Hair on, attracted, but not at quite ſo great a Hight as his Face did. Then the Leaf-Braſs was placed under his Feet, his Shoes and Stockings being on, and the Tube held near his Head, his Feet attracted, but not altogether at ſo great a Hight as his Head: Then the Leaf-Braſs was again laid under his Head, and the Tube held over it, but there was then no Attraction, nor was there any when the Leaf-Braſs was laid under his Feet, and the Tube held over them.

April the 16th, I repeated the Experiment with the Boy, but now the Attraction was not quite ſo ſtrong as at the firſt, the Braſs not riſing higher than to about ſix Inches. His Hands being ſtretched nearly horizontal, I placed a ſmall Stand with Leaf-Braſs under each Hand, and under his Face the great one, furniſhed as the others; when the excited Tube being held near his Feet, there was an Attraction by his Hands and Face at the ſame Time. I then gave him the Top of a Fiſhing-Rod to hold in his Hand; there was a

Ball

Ball of Cork ſtuck on the little End of it, under which the Leaf-Braſs being laid, and the Tube rubbed and held near his Feet, the Ball attracted the Leaf-Braſs to the Hight of two Inches, and repelled it, and attracted for ſeveral Times together with great Vigour.

April 21, I again repeated the Experiment on the Boy; and now he attracted much ſtronger than at the firſt: The Leaf-Braſs roſe to his Face at the Hight of more than twelve Inches. Then I gave the Boy to hold in each Hand the Tops of two Fiſhing-Rods, with a Ball of Cork on each of their leſſer Ends; then a ſmall Stand being ſet under each Ball, with the Leaf-Braſs on it, the Tube being rubbed, and held near his Feet, both the Corks attracted and repelled together ſtrongly. The Length of the Poles were each of them about ſeven Feet. Then the Boy was laid on his left Side, and a Fiſhing-Rod, of near twelve Feet in Length, given him to hold with both his Hands; there was a ſmall Ball of Cork at the End of the Rod, that was an Inch and three quarters Diameter: Then all Things being prepared, the Tube held near the Boy's Feet, the Cork Ball attracted and repelled the Leaf-Braſs with Force to the Hight of at leaſt two Inches.

Note, That when I ſpeak of holding the Tube near the Boy's Feet, I mean over againſt the Soles of his Feet; and when near his Head, is to be underſtood the Crown of his Head; for when the Tube is held above, or over his Legs, the Attraction is not ſo ſtrongly communicated to the other Parts of his Body.

By these Experiments we see that Animals receive a greater Quantity of Electrick Effluvia, and that they may be conveyed from them several Ways at the same Time to considerable Distances, wherever they meet with a Passage proper for their Conveyance, and there exert their Attracting Power.

In these Experiments, besides the large Stand above-mentioned, I made use of two small ones, which, as I found them very useful, it may not be improper to describe them. The Tops of them were three Inches Diameter; they were supported by a Column of about a Foot in Hight, their Bases of about four Inches and a half: They were turned of *Lignum vitæ*; their Tops and Bases made to skrew on for Convenience of Carriage. Upon the Tops were pasted white Paper. When the Leaf-Brass is laid on any of these Stands, I find it is attracted to a much greater Hight than when laid on a Table, and at least three Times higher than when laid on the Floor of a Room.

June 20, *I made the following Experiment, shewing that the* Attraction *and* Repulsion *is as strong, if not stronger, and that the* Effluvia *may be carried to great Lengths, without touching the Line by the Tube.*

There was taken a Line of Packthread 231 Feet in Length; it was supported on two cross Lines of blue Silk; the Distance of these Lines was near eighteen Feet. About four Feet below one of these Lines, was put up another Silk Line of the same Colour: To this was tied one End of the Packthread; at the other End the Ivory Ball hung; the Line was returned over

the croſs Lines thirteen times; then the Leaf-Braſs being laid under the Ball, upon one of the ſmall Stands, and the Tube excited, the Ball attracted and repelled to the Hight of one of its Diameters, which was about an Inch and a quarter.

I have, by ſeveral Trials lately made, found that rubbing the Tube, and putting it up between the Returns of the Line in ſeveral Places, before I go with the Tube to the End of the Line, much facilitates, and cauſes the Attraction much ſooner than when one ſtands with the Tube and applies it to the End of the Line only.

About the middle of July *I went into the Country, and* Auguſt 1, *at Mr.* Wheler's, *we made the following Experiment; being an Attempt to ſee how far the* Electrick Vertue *might be carried forward in a Line, without touching the ſame.*

This Experiment was made by carrying the Line out of the Great Parlour Window into the Garden, and down the great Field before it. The Line was ſupported by fifteen Pair of Poles; each Pair had a Line of blue Silk tied from one Pole to the other, the Length of about four Feet, equal to the Diſtance of the two Poles: About ten Feet from the Window there was a Silk Line put up croſs the Room, upon which that Part of the Line hung that had the Ivory Ball upon it. Below the croſs Line of the fartheſt Pair of Poles was placed another croſs Line, four Feet from the Ground, to which was faſtened the other End of the communicating Line, as mentioned in the Experiment above: Then the Leaf-Braſs and Tube being pre-

pared as uſual, the Tube being held over the Line at ſeveral Diſtances, beginning towards that End where the Ball hung, and ſo proceeding towards the farther End of the Line, the Leaf-Braſs was attracted at the Stations not exceeding two or three hundred Feet, pretty ſtrongly; but ſtill grew weaker as we came towards the farther End of the Line: Yet even at the End of the Line the Leaf-Braſs would be lifted by the Ball, when the Tube touched the Line, whoſe Length was 886 Feet.

I ſhould now have given ſome Account of the Diſcovery I made the laſt Year concerning the Attraction of coloured Bodies, ſhewing that they attract more or leſs, according to what Colours they are of, though the Subſtance be the ſame, and of equal Weight and Bigneſs; only I ſhall obſerve, that I find the Red, Orange or Yellow, attract at leaſt three or four times ſtronger than Green, Blue or Purple: But having very lately found out a new and more accurate Method of making theſe Experiments, I muſt beg Leave to proceed farther with them, before I communicate them. I am,

SIR,

Your Humble Servant,

Charter-Houſe,
Feb. 8, 173⅝.

STEPHEN GRAY.

VI. *Cur-*

VI. *Curvarum Hyperbolicarum, æquationibus trium nominum utcunque definitarum, Quadratura generalis duplici Theoremate exhibita à D°.* Samuele Klingenſtierna, *Profeſſ. Digniſſ. Math. in Acad.* Upſal, *& R. S. S. Communicante D°.* Jacobo Stirling, *ejuſdem etiam Soc. Doctiſſ. S.*

N.B. *CURVÆ Hyperbolicæ, de quarum quadraturâ hic agitur ab Erud. Auctore, ad unum quaſi genus reducuntur, ex communi quâ gaudent proprietate, quantumvis obſcura ſit nec ſatis per ſe determinata. Ad hoc enim genus refertur, omnis curva, cujus ordinata datum efficit rectangulum cum recta, quæ ex tribus partibus neceſſario diverſis & ordine genitis conſtituitur. Diverſæ partes eſſe intelliguntur, quæ ex diverſis abſciſſæ poteſtatibus quomodocunque oriuntur; Ordine autem genitæ ſunt, ſi modo ab ima ad ſummam poteſtatem æquis gradibus aſcendant.*

Species igitur determinantur ac definiuntur ex gradibus Poteſtatum determinatis & definitis.

Primas & ſimpliciſſimas hujus generis (ad quas etiam ceteræ omnes ultimo reducuntur) Neutonus *ipſe primus ex datis Circuli & Hyperbolæ areis dimenſus eſt.*

Coteſius *deinde plures eſſe hujus generis Species, etiam in infinitum (ſecundum ordinem determinatum) progredientes detexit, quæ ad eandem quadra-*

turæ

turæ formam ac priores iſtæ & ſimpliciores reduci poſſint ; idque fecit ope Theorematis cujuſdam novi de Inventione radicum æquationum binomialium, ex determinata quadam diviſione circumferentiæ Circuli in partes æquales ; cujus Theorematis mentio facta eſt in Erudito ſuo Opere de Harmonia menſurarum.

Iiſdem veſtigiis inſiſtendo D. Moivræus *Theorema Coteſianum ulterius promovit ad inventionem radicum æquationum Trinomialium, idque adhibendo arcum circuli determinatæ magnitudinis vice circumferentiæ totius. Quo invento omnes hujus generis Species inter ſe commenſurabiles eſſe ſecundum rationem quadraturæ ſuæ ſtatim perſpexit, Methodumque tradidit in exquiſitis ſuis ſcriptis* Miſcellaneis *nuper editis, quâ perveniatur ad quadraturam unius cujus libet formæ ex datis Circuli & Hyperbolæ quadraturis.*

Ds. Kl. *in Propoſitione ſua, quæ ſequitur, in unum collegit quicquid de quadraturis curvarum hujus generis antehac a prioribus inventum fuit. Verum tamen ita collegit non quaſi ſint variæ formæ ſub uno genere, ſed quaſi una ſit eademque forma generis ipſius. Theorema duplex eſt, quatenus quadratura referat ad aream vel citra, vel ultra ordinatam. Exhibetur in ipſis æquationis terminis ſine reductione aut reſtrictione. Inſtituitur ſecundum* Coteſii *doctrinam, uſurpando menſuras Angulorum & Rationum pro areis Circuli & Hyperbolæ. Traditur ſine demonſtratione, utpote cujus veritas facile innoteſcat ex Propoſitionibus* Moivræanis.

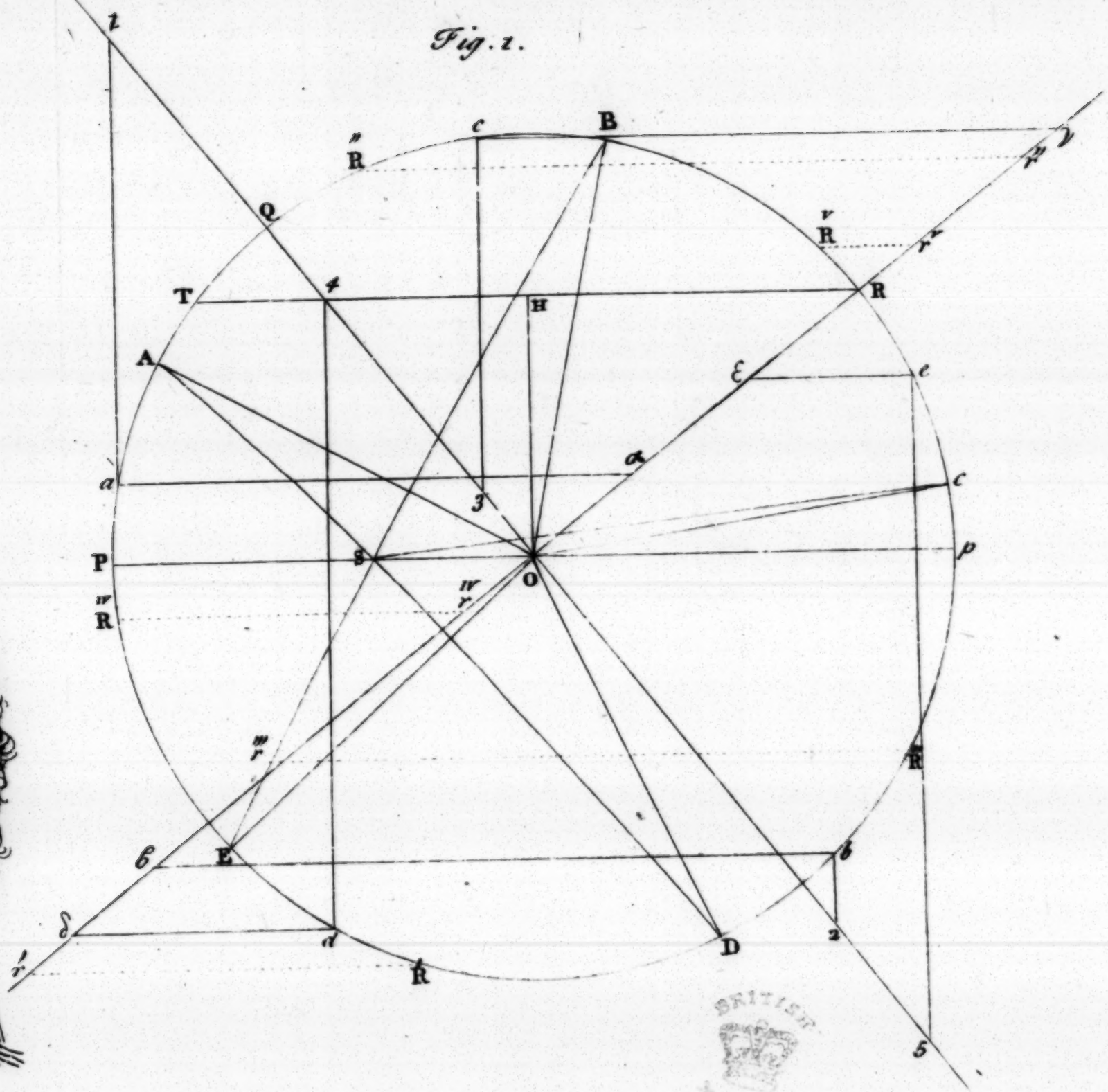
Hæc

Fig. 2.

Phil. Trans. N.° 417.

TAB. II.

Fig. 1.



Hæc de hujus doctrinæ fontibus indigitasse, non abs re fore judicatum est, ne, lectoribus inexercitatis, auctoris nimia brevitas impedimento esset.

Propositio.

Quadrare curvam, cujus abscissa est z & ordinata $\frac{cz^{n\pm\frac{1}{n}-1}}{a^{2n}\pm a^{n-1}bz^n+z^{2n}}$, ubi n designat numerum quemlibet, r & n numeros quoslibet integros & primos inter se, & denominator $a^{2n}\pm a^{n-1}bz^n+z^{2n}$ non potest resolvi in duos factores binomios.

In circumferentia circuli (*Tab.* 2. *Fig.* 1.) centro quovis O intervallo $OR = a$ descripta applicetur chorda $RT = b$, cui parallelus ducatur radius OP, ita quidem ut arcus PR sit quadrante major si habeatur $+b$, minor vero si habeatur $-b$. Incipiendo in puncto R, sumantur ordine tot arcus $\overset{1}{R}\overset{1}{R}$, $\overset{II}{R}\overset{II}{R}$, $\overset{III}{R}\overset{III}{R}$, $\overset{IV}{R}\overset{IV}{R}$, $\overset{V}{R}\overset{V}{R}$, &c. arcui PR æquales, quot unitates continet fractio $\frac{m}{n}$, & a punctis $\overset{1}{R}$, $\overset{II}{R}$, $\overset{III}{R}$, $\overset{IV}{R}$, $\overset{V}{R}$, &c. ducantur totidem rectæ $\overset{1}{R}\overset{1}{r}$, $\overset{II}{R}\overset{II}{r}$, $\overset{III}{R}\overset{III}{r}$, $\overset{IV}{R}\overset{IV}{r}$, $\overset{V}{R}\overset{V}{r}$, &c. radio OP parallelæ & rectæ OR occurrentes in punctis $\overset{1}{r}$, $\overset{II}{r}$, $\overset{III}{r}$, $\overset{IV}{r}$, $\overset{V}{r}$, &c. Deinde dividatur arcus PR in tot partes æquales quot sunt unitates in numero n, quarum illa quæ puncto P

ad-

adjacet ſit P A. Facto initio in puncto A dividatur integra circumferentia in tot partes æquales A B, B C, C D, D E, &c. quot ſunt unitates in n; ſumtaque in radio O P, producto ſi opus ultra P, abſciſſa $OS = a.\left|\frac{z}{a}\right|^{\frac{n}{n}}$, jungantur S A, S B, S C, S D, S E, &c. ut & O A, O B, O C, O D, O E, &c. Denique ſumantur arcus P A a, P B b, P C c, P D d, P E e. &c. qui ſint ad arcus P A, P B, P C, P D, P E, &c. ut n ad unitatem, & a punctis a, b, c, d, e, &c. ducantur tum rectæ $a\alpha$, $b\beta$, $c\gamma$, $d\delta$, $e\varepsilon$, &c. parallelæ radio O P, & occurrentes rectæ O R in punctis α, β, γ, δ, ε, &c. tum etiam rectæ a 1, b 2, c 3, d 4, e 5, &c. prioribus normales, & rectæ Q O, quæ ad R O ducatur perpendicularis, occurrentes in punctis 1, 2, 3, 4, 5, &c.

His factis area curvæ cujus abſciſſa eſt z & ordinata $\frac{c\,z^{\frac{r}{n}-1}+\&c.}{a^{\frac{r}{n}}\pm a^{\frac{r}{n}-1}bz^{\frac{1}{n}}+z^{\frac{r}{n}}}$ erit $\frac{n\,c}{r}z^{\frac{r}{n}}$ in

$$\frac{R^{\frac{1}{r}}}{r-n}\times\frac{a}{z}\Big|^{\frac{r}{n}}-\frac{R^{\frac{II}{r}}}{r-2n}\times\frac{a}{z}\Big|^{\frac{r}{n}}+\frac{R^{\frac{III}{r}}}{r-3n}\times\frac{a}{z}\Big|^{\frac{r}{n}}-\frac{R^{\frac{IV}{r}}}{r-4n}\times\frac{a}{z}\Big|^{\frac{r}{n}}-\frac{R^{\frac{V}{r}}}{r-5n}\times\frac{a}{z}\Big|^{\frac{r}{n}},\ \&c.$$

$$+\frac{c}{a^{\frac{r}{n}}}\text{ in }\begin{cases}-a\alpha\,(SA:AO)-a_1\,(+SAO)\\+b\beta\,(SB:BO)+b_2\,(+SBO)\\-c\gamma\,(SC:CO)+c_3\,(+SCO)\\+d\delta\,(SD:DO)-d_4\,(-SDO)\\+e\varepsilon\,(SE:EO)+e_5\,(-SEO)\end{cases}$$

&c. &c.

Et

Et area curvæ cujus abſciſſa eſt z & ordinata $\frac{c z^{n-\frac{r}{n}n-1}}{a^{2n} \pm a^{n-1} b z^n + z^{2n}}$, erit $\frac{nc}{na^{n+1}} z^{1-\frac{r}{n}n}$ in

$$\frac{\overset{\text{I}}{R}{}^{\text{I}}_{r}}{r-n} \times \frac{z}{a}\Big]^n - \frac{\overset{\text{II}}{R}{}^{\text{II}}_{r}}{r-2n} \times \frac{z}{a}\Big]^{2n} + \frac{\overset{\text{III}}{R}{}^{\text{III}}_{r}}{r-3n} \times \frac{z}{a}\Big]^{3n}$$

$$- \frac{\overset{\text{IV}}{R}{}^{\text{IV}}_{r}}{r-4n} \times \frac{z}{a}\Big]^{4n} - \frac{\overset{\text{V}}{R}{}^{\text{V}}_{r}}{r-5n} \times \frac{z}{a}\Big]^{5n}, \text{ \&c.}$$

$$+ \frac{c}{n} a^{-\frac{r}{n}n-n-1} \text{ in } \begin{Bmatrix} -a\alpha\,(\text{SA:AO}) - a_1(+\text{ASO}) \\ +b\beta\,(\text{SB:BO}) + b_2(+\text{BSO}) \\ -c\gamma\,(\text{SC:CO}) + c_3(+\text{CSO}) \\ +d\delta\,(\text{SD:DO}) - d_4(-\text{DSO}) \\ +e\varepsilon\,(\text{SE:EO}) + e_5(-\text{ESO}) \end{Bmatrix}$$

&c. &c.

Harum arearum prior adjacet abſciſſæ ad ordinatam terminatæ, poſterior vero abſciſſæ ultra ordinatam productæ. Signa autem quantitatum has expreſſiones ingredientium ita determinantur: 1. Rectæ $\overset{\text{I}}{R}{}^{\text{I}}_{r}$, $\overset{\text{II}}{R}{}^{\text{II}}_{r}$, $\overset{\text{III}}{R}{}^{\text{III}}_{r}$, &c. afficiuntur ſignis affirmativis, ſi a punctis circumferentiæ $\overset{\text{I}}{R}$, $\overset{\text{II}}{R}$, $\overset{\text{III}}{R}$, tendunt ſecundum directionem O P, negativis vero ſi ab iiſdem punctis ſecundum directionem contrariam P O procedunt. 2. Moduli rationum $a\alpha$, $b\beta$, $c\gamma$, &c. ſigna habent affirmativa, ſi a punctis a, b, c, &c. tendunt ſecundum directionem O P, negativa ſi ſecundum contrariam. 3. E centro circuli O

 cadat

cadat in chordam R T normalis O H. Et moduli angulorum *a* 1, *b* 2, *c* 3, *&c.* ſignis gaudebunt affirmativis ſi a punctis *a*, *b*, *c*, *&c.* tendunt ſecundum directionem H O, negativis ſi ſecundum contrariam. 4. Producatur radius P O donec circumferentiæ denuo occurrat in *p*, & anguli S A O, S B O, S C O, *&c.* ut & A S O, B S O, C S O, *&c.* ſumi debent affirmative ſi exiſtunt in ſemicirculo ſuperiore P R *p*, negative ſi in inferiore. Et ſecundum has regulas ſigna quantitatum quibus areæ exprimuntur noſtræ figuræ accommodavimus.

VII. *Caſus rariſſimus* Plicæ Polonicæ *enormis à* D. Abrahamo Vatero, *M. D. Prof. Anatom.* Wittemberg. *& R. S. S. per* D. Conradum Sprengell, *Equitem, M. D. R. S. S. & Coll. Med.* Lond. *Licent. communicatus.* Vid. Tab. II. Fig. 2.

FŒMINA ruſtica in Polonia, in terris Principis Radzivil, anno ætatis decimo quinto, viro nupta, incidit decimo octavo, in morbum Poloniæ Endemium, qui Plica Polonica a capillo inenodabili vocatur. Hanc Plicam per quinquaginta annos fœmina geſtavit, ac per totum fere illud tempus dolore arthritico et contracturis tandemque maraſmo univerſali corporis afflicta tecto affixa fuit, tandemque ſenio confecta anno ætatis ſeptuageſimo octavo diem ſuum obiit.

obiit. Fœminam iſtam adhuc viventem vidit non tantum, & hac figura ad vivum depingere curavit, ſed ipſam Plicam poſt obitum reſectam ſecum Wittebergam attulit Clariſſ. D. Flouricke dicti Principis Medicus. Erat autem Plica quatuor ulnas longa, palmum lata, duoſque pollices craſſa, ſed altero tanto longior foret, ipſo referente, niſi magna ejus pars, temporis quo ægra decubuit diuturnitate, ſqualore & attritu conſumpta fuiſſet. Hunc ergo Caſum penitus extraordinarium, illuſtriſſimæ Societati Regali exponere volui. Spero autem fore, ut impoſterum de circumſtantiis ſingularibus hujus caſus a laudato Viro certior reddar, quas alio tempore communicabo.

VIII. *An Extract of a Letter from Sir* Conrad Sprengell, *M. D. R. S. S. & Coll. Med.* Lond. *Licen. to Dr.* Mortimer; *wherein he incloſed the foregoing Account of the* Plica Polonica; *together with an Article from the* Breſlaw Sammlung von Natur- und Medicin, &c. Geſchichten *upon the ſame Subject, tranſlated from the* High-Dutch *by Dr.* Mortimer, *R. S. Secr.*

SIR, *January 20th,* 173⅝.

* * * THE PLICA has been always related, and thought to be a Diſtemper, and to proceed from a Fever or Convulſions; but for my Part, from the beſt Information I could get concerning it, I

think it a Product of Naſtineſs, by not combing their Hair, nor waſhing their Heads; for if it were a real Diſtemper, the People of Faſhion could no more be free from it than the ordinary People, among whom (*i. e.* the ordinary and poor) it only happens. This is confirmed by an inquiſitive Perſon, a Correſpondent of Mr. *Joh. Henry Lincke, F. R. S.* of *Lipſick*, who ſent the following Article to the Society of *Breſlaw*, in whoſe *Tranſactions*, entituled, **Sammlung von Natur-** &c. *Anno* 1724, *Artic.* 17, *Menſe Auguſto*, *p.* 126, it is inſerted to this Purpoſe.

" The great Multitude of People in *Poland*, who " are troubled with this PLICA, firſt made me re- " flect, whether it were a real Diſeaſe or no? But I " am now convinced, that their ſwiniſh Way of li- " ving, and the common Opinion ſo deeply rooted in " the Generality of People, that this Lock of Hair " cannot be taken off without Danger of their Lives, " have contributed more to this Complaint than any " real Indiſpoſition of Body; conſidering that it is " the middling or poor People, who are troubled " with it; whom then one cannot look on without " Horror: But no *German*, of whom there are great " Numbers, who live in that Country, ever had any " ſuch thing grow. Many of them, who are mar- " ried to Women of *Poliſh* Birth, are ſcarce able to " perſwade their Wives not to train up their Chil- " dren to this Naſtineſs. Not long ſince I ſaw a " Fellow in the Church, who had about ſeventy of " ſuch Locks hanging down from his Head, which

" were

" were as hard twiſted, as ſo many Penny Cords;
" that one might eaſily have taken his for a *Medu-*
" *ſa*'s Head; and who knows, but that in ancient
" Times ſome ſuch Locks as theſe might have given
" Riſe to the Poetical Fiction of Snakes growing
" on the Head inſtead of Hair? Be that as it will,
" this is certain, it is a moſt odious Sight to look
" on.

IX. *An Account of an unuſual Agitation in the* Magnetical Needle, *obſerved to laſt for ſome Time, in a Voyage from* Maryland, *by Capt.* Walter Hoxton; *communicated in a Letter to* David Papillon, *Eſq; F. R. S.*

ON the ſecond of *September*, 1724, a little after Noon, being in Latitude 41° 10′ N. and Difference of Longitude from Cape *Henry* in *Virginia* about 28° 00′ E. the Weather fair, a moderate Gale, and ſmooth Sea, my Mate, who was on the Deck, came and told me, that the Compaſs traverſed ſo much that he could not poſſibly ſteer by it: Whereupon I went up, and after trying it in ſeveral Parts of the Ship, found what he ſaid to be true. I then had all my Compaſſes brought up, and placed in different Parts of the Ship, and in Places moſt remote from Iron, and, to my great Surprize, found them all in the ſame Condition; ſo that we could not ſteer by any of them. I then new touched ſome of them with a Loadſtone, which

which I always carry with me; and leſt that ſhould affect them, ſent it out to the End of the Bowſpreet; but I did not perceive that the new touching was of any Service, for they all continued traverſing very ſwiftly, for about an Hour after I came on the Deck, and then on a ſudden every one of them ſtood as well as uſual. During the whole Time, the Ship had very little Motion; and I had an Azimuth Compaſs, and four or five others.

FINIS.

ERRATA which have eſcaped Notice till now.

NUMB. 415. p. 378. l. 5. for *majore* read *minore*. Numb. 416. p. 444. l. 8. from the Bottom, for *dead* read *down*. Ibid. l. 7. for *ghoſtly* read *gaſtly*.

Jos: Banks

Numb. 418.

PHILOSOPHICAL TRANSACTIONS

For the Months of *March*, *April* and *May*, 1731.

The CONTENTS.

I. *An Account of an* Aurora Borealis *ſeen in* New-England *on the* 22*d of* October, 1730, *by Mr.* Iſaac Greenwood, *Profeſſor of Mathematicks at* Cambridge *in* New-England. *Communicated in a Letter to the late Dr.* Rutty, *R. S. Secr. Vid.* TAB. I.

II. *An Account of the ſame* Aurora Borealis, *by Mr.* Richard Lewis; *communicated in a Letter to Mr.* Peter Collinſon, *F. R. S.*

III. *A new and exact Table collected from ſeveral Obſervations taken from the Year* 1721 *to* 1729, *in nine Voyages to* Hudſon's Bay *in* North-America, *by Capt.* C. Middleton; *ſhewing the* Variation of the Compaſs *according to the Latitudes and Longitudes under-mentioned, accounting the Longitude from the Meridian of* London. *Communicated by Mr.* Benj. Robins, *F. R. S.*

IV. *Obſervations on the* Weather, *in a Voyage to* Hudſon's Bay *in* North-America, *in the Year* 1730, *by Mr.* Chriſtopher Middleton. *Communicated by the ſame.*

V. *A*

V. *A Letter from Mr.* Martin Triewald, *Director of Mechanicks to the King of* Sweden, *and F.R.SS. of* England *and* Sweden, *to Sir* Hans Sloane, *Bar^t. Pres. R. S. relating to an extraordinary Instance of the almost instantaneous* freezing of Water; *and giving an Account of* Tulips, *and such* bulbous Plants, *flowering much sooner, when their Bulbs are placed upon Bottles filled with Water, as in* TAB. II. *than when planted in the Ground.*

VI. *An Account of some Experiments, relating to the Flowering of* Tulips, Narcissus's, &c. *in Winter, by placing their Bulbs upon Glasses of Water, made by Mons.* Triewald, *Director of Mechanicks at* Stockholm, *and F. R. SS. of* England *and* Sweden, *and read before the* Royal Society May *the 7th,* 1730, *as they were tried the next Season by* Philip Miller, *F. R. S. Gardiner to the worshipful Company of* Apothecaries, *at their Botanick Garden in* Chelsea.

VII. *A Letter from* T. Madden, *M. D. of* Dublin, *to* Cromwell Mortimer, *M. D. R. S. Secr. giving an Account of* two Women being poisoned *by the* SIMPLE DISTILLED WATER OF LAUREL-LEAVES, *and of several Experiments upon Dogs; by* which *it appears that this* LAUREL-WATER *is one of the most* DANGEROUS POISONS *hitherto known.*

I. *An Account of an* Aurora Borealis *ſeen in* New-England *on the* 22*d of* October, 1730, *by Mr.* Iſaac Greenwood, *Profeſſor of Mathematicks at* Cambridge *in* New-England. *Communicated in a Letter to the late Dr.* Rutty, *R. S. Secr.*

SIR, Harvard-College, Oct. 24, 1730.

THE *Aurora Borealis* has been very frequent with us of late; but none either for Brightneſs, Variety or Duration, ſo conſiderable as what occurred on the laſt *Thurſday* Night, which was the 22d of *October*. This Meteor has been obſerved in *New-England*, at different Times, ever ſince its firſt Plantation; but I think at much longer Intervals than of late Years, and never to ſo great a Degree as the preſent Inſtance: Nor indeed is there any recorded in the *Philoſophical Tranſactions*, that I could think, by their Deſcription, equal to it; excepting only that celebrated one of the 6th of *March*, 1716, obſerved by the moſt judicious and learned Dr. *Halley*, and in many Reſpects that alſo muſt give the Preference to it. And on this Account I have thought the moſt particular Deſcription of this Meteor would not be unacceptable to you; and have therefore ſent all my Notes relating thereunto, which are very numerous, almoſt to every Change and Circumſtance of the Appearance. I am perſwaded there is no better Way to arrive at the

true Cauſe of this extraordinary Phænomenon, than by attending to the minuteſt Particulars and Circumſtances thereof; and if what I have done contributes thereunto, I ſhall eſteem it a ſufficient Excuſe for the Number and Particularity of my Notes.

Observation I. Tab. I. Fig. I.

Oct. 22, 1730, 6^h 30′ *P. M.* There lay near the Horizon an extended duskiſh Vapour reaching from N W by N. to N E by E. The upper Edge was the Segment of a Circle, whoſe greateſt Height from the Horizon was about 15° bearing nearly N by E. Adjoining to this was a concentric Segment of a very light Azure, of a greeniſh Caſt, ſtrongly illuminated, a few Degrees in Breadth, and then dilated more and more till it became blended with an extenſive Brightneſs, or *Aurora*, which lay every where above it for about 45 Degrees. There was in ſeveral Places a faint Caſt of Red. The Heavens were every where elſe perfectly ſerene; a ſmall Weſterly Wind, and the Moon above 80° below the Eaſtern Horizon.

Observation II. 6^h 35′.

Two Striæ riſing perpendicularly from different Parts of the illuminated Edge of the Vapour (which I all along ſuppoſe to continue its Figure, when there is no particular Note to the contrary) Theſe were of a faint Red, and to the Height of 45° at leaſt.

Observation III. 6^h 40′.

The Striæ were very numerous to the Left, each about 45°; and one in the Middle (by which I ſhall always

always mean the Middle of the Northern dusky Vapour) roſe to a ſurpriſing Height. It was 8° or 10° in Breadth; of a light Azure tinged with Green, and in ſeveral Places ſtreaked vertically with a bright Flame-Colour. There was alſo N W by N. a large Area or Body of a very intenſe Red.

Observation IV. 6h 45′. Fig. 2.

The whole extraordinarily luminous. The Red diffuſed in all Parts above the greeniſh Light, which now bounded the duskiſh Vapour in the North; and indeed ſeveral Parts of this were tinged therewith alſo. But the moſt intenſe Red was towards the N W. and N E. by E. between which were various pyramidical Streams of different Colours, ſome Blue, ſome Green, others Flame-coloured, &c. many tinctured with, and all terminated by the diffuſive Roſineſs. One Stria was of a ſurpriſing Luſtre, of a light Azure turned upon Green, appearing N W. by N. This Scene was very beautiful, the Height of each Column about 45°, and many of them well defined.

Observation V. 6h 50′.

The enlightned Part of the Hemiſphere was every where tinged with Red; its horizontal Bounds the ſame as before, but its Altitude about 70°. Whence it appears the *Aurora* is conſiderably extended upwards. The reddiſh Caſt on the right Hand from North to Eaſt was beautifully diſtinguiſhed into perpendicular Striæ, which generally obſerved the following Order of Colours, beginning from the Eaſt; *viz.* a deep Azure, which ſucceſſively proceeded to the lighteſt

Blues (though each Column was of ſuch Intenſity as to be diſtinguiſhed from the neighbouring Columns) after which followed ſeveral Degrees of Green, and then of Red, the deepeſt being an intenſe Scarlet. And this Order was repeated ſeveral times, filling up the whole Space from N E. to N by W. The Weſtern Regions were at the ſame Time of an undiſtinguiſhed Red. Many of the riſing Columns were very exactly terminated.

Observation VI. 6h 55'. Fig. 3.

The Red, which in the laſt lay towards the Zenith, became very intenſe; darting to the horizontal Vapour, throughout the intermediate Space innumerable Striæ differently coloured. The horizontal duskiſh Cloud was ſomewhat raiſed; an apparent Stratum of Blue juſt under it, which towards the Horizon was of a fainter Caſt, as the Colour of the Sky is when over-charged with Vapours. I ſhould not forget that the upper Surface of Red jutted out, irregularly, in ſeveral Places, though in general well terminated; as I have obſerved the Caſe has been in ſome riſing Clouds.

Observation VII. 7h 0'.

The diſtinguiſhed Red towards the Zenith, approaching nearer thereunto; it is about 20° broad upon our Meridian, and thence tapering to the Eaſtern and Weſtern Horizon. The whole Appearance is of a reddiſh Hue, its in ſome Places faintly ſtreaked. At this Juncture appeared E S E. conſiderably removed from the other Phænomena, a remarkable Oval, the tranſverſe Diameter erect, about 30° in Length, and of a very

very bright Azure. The whole Scene was very beautiful.

OBSERVATION VIII. $7^h\ 2'\frac{1}{2}$. FIG. 4.

The Phænomena much the ſame, excepting that the reddiſh Caſt has roſe, and is now diffuſed to the Southward of the Zenith. The other Parts of the Northern Hemiſphere much like the genuine *Aurora*, interſperſed with various ſmall Clouds. There are two diſtinguiſhed Parallellogramic Areæ of an intenſe Red, nearly 30° in Diameter, the one to E by N. the other to N W. which was of the deepeſt Colour, and croſſed in the Middle with a black Bar. The bright Azure Oval ſtill remains towards the E S E.

OBSERVATION IX. $7^h\ 5'$.

The whole Appearance ſeemingly vaniſhed, excepting that the Northern Regions retained the *Aurora*, which was as bright as about half an Hour after Sun-ſet. The Eaſtern Area of Red was diſtinguiſhable, though very faint, reaching from 30° to 50° high; alſo the former Area to the N W. ſomewhat more intenſe. This was the ſame as in the laſt Article; and the black Bar mentioned then, appeared now to be a Cloud moving Eaſtward, Part whereof was ſeen on this red Area, and Part to the North. And in this View the red Vapour appeared vaſtly more diſtant than the Cloud. There were ſeveral ſmall Spaces of Light interſperſed throughout the Scene.

OBSER-

Observation X. 7h 15′.

The Appearance ſomewhat changed. The Area of Red N W. was the moſt intenſe. Several riſing Columns of a faint Red and Blue between Weſt and North. A deep Red E by N. I have all along obſerved, that ſome of the fixed Stars could be ſeen through all the Colours that have ſucceſſively laid upon them, though with conſiderable Differences as to Obſcurity and Clearneſs, according to the Intenſities of the Colours. No Clouds in the Southern Regions.

Observation XI. 7h 20′.

It is now neceſſary for me to obſerve, that the Wind has been all along Weſt and W by N. and if the ſtrongeſt Winds be expreſſed by 10, this was ſometimes 2, and, I think, never leſs than Unity. I am informed that at *Boſton*, which lies about three Miles Eaſtward, it was all the while to the Eaſtward of the South. The *Aurora* ſtill of the ſame Dimenſions, but the Edge of the duskiſh horizontal Cloud much abated of its Brightneſs and Colour. There are four remarkable Spots, or Areæ of Red, one E by N. one N E. by N. very intenſe, as alſo was another nearly North; and the laſt bore N W. by N. which, with the E by N. has been of ſome conſiderable Duration.

There were ſeveral conſiderable Striæ intermixed with Red, and a Flame-colour riſing about N N W.

Observation XII. 7h 28′.

The Redneſs about the North increaſed in its Dimenſions and Intenſity very much. It reaches from the North Star to about 20° upwards, and for about 12° is exceedingly bright.

It is diſtinguiſhed into ſeveral perpendicular Columns of various Degrees of Red, and many well terminated.

Observation XIII. 7h 30′.

The Redneſs NE by N. moves Weſtward, and is conſiderably altered in that reſpect ſince the firſt Obſervation thereof. That about the North Star is now divided in the Middle by a perpendicular Column, very broad, and of a very intenſe yellow Light. It appears now that this alſo has a ſlow Motion Weſtward: But the Weſtern Redneſs has all along advanced Eaſtward at a conſiderable Rate.

Observation XIV. 7h 37′. Fig. 5.

The three red Areæ juſt mentioned are now united, and nearly confounded with one another. The Diſtinction is only as to the Degree of Redneſs. The *Aurora* which lies partly under theſe is conſiderably abated of its Luſtre; and the horizontal Bounds contracted to about 80°, though the Altitude is rather increaſed. The Eaſtern and Weſtern Limits ſeem ſtill to approach one another very ſlowly. There was one Stria very conſiderable, horizontally poſited, and about 5° broad, of a bright Flame-colour, reaching from

from the horizontal Bounds throughout the whole Meteor Arch-wiſe, whoſe greateſt Height was about 15°.

Observation XV. 7h 45′.

The Flame-coloured Arch much diminiſhed. The Redneſs very evident, and contiguous; though in ſome Places of different Intenſities, and viſibly increaſing about N by W. On each Side of which there was a diſtinguiſhed Ruddineſs.

Observation XVI. 7h 51′.

The Diſtinction of Redneſs about N by W. changed to a more intenſe uniform Redneſs, which ſeemed to be by the Union of the aforeſaid diſtinguiſhed Areæ; and the greateſt Intenſity was in the middle Space that was between them; *viz.* N by W. At this Juncture I was not a little ſurprized with an extraordinary Flaſh of Lightning very bright, which began about the Midſt of this congregated Vapour, and ran with an oblique undulatory Motion for 20° towards the Horizon.

Observation XVII. 8h 1′.

The Redneſs ſtill continues, but much abated.

Observation XVIII. 8h 9′.

The Meteor ſcarce to be diſtinguiſhed but by the *Aurora*, which reaches from N W. to E. in ſuch Sort of Curve that the higheſt Part is due North about 40° of Altitude. There is ſtill a reddiſh Caſt N N W.

Observation XIX. 8h 30′.

The Colours not very conſiderable; but the Form entirely new. The Breadth of the Redneſs was from the Pole Star downwards about 20°; and from thence it run Tapering on the left Hand to W by N. and on the Right to the Eaſt. In which Points it was of no diſcernable Breadth. Its upper Edge was of the deepeſt Red, which dilated by Degrees to a Flame-colour, and could ſcarce be diſtinguiſhed from the neighbouring *Aurora*. However, there were two Spots, one to the Right, and the other to the Left, in the extenſive Arch of a remarkable Sadneſs.

Observation XX. 9h 25′. Fig. 6.

Was an extraordinary beautiful Appearance. From the Zenith about 20° Southward, an uncommon Redneſs was formed, as it were into a Knot or Canopy, very diſtinctly terminated (eſpecially on the South Parts) about 20° in Length, which lay Eaſt and Weſt, and little leſs in its Dimenſions North and South. From this iſſued innumerable Striæ throughout the Northern Hemiſphere and farther, the horizontal Bounds being W S W. to E S E. Theſe Striæ were diſperſed in an exact Order, proceeding from the aforeſaid Knot, as Folds equally diverging, and each of the ſame Colour and Brightneſs throughout the whole Space to the Horizon. The Order of the Colours was very agreeable, interchangeably Blue, Red, and then Flame-colour; each of which was alſo diſtinguiſhed into Striæ of various Intenſities, from the deepeſt Blue to the lighteſt; from the Bounds of Violet, to a Tincture of Orange;

and laſtly, from the Colour of the *Aurora* to the brighteſt Flames. And this Order was repeated innumerable Times throughout the whole Scene. The whole was as bright, and in many Reſpects reſembled a Series of Rainbows vertically poſited; and in this View the Generality of People will always remember it. And indeed were the Heavens to be diſpoſed into innumerable Rainbows (excepting only the greater Number of primitive Colours) it would ſcarce exceed this Phænomenon in Beauty: And the Knot from whence it ſeemed to proceed, far ſurpaſſes any of the Redneſs of that Meteor, and even Blood itſelf. It may not be amiſs to obſerve here, that the Weſtern Breeze has been for ſome time ſince perfectly lulled; nor is there the leaſt Motion in any Part of the Heavens.

The Northern Bank of Vapours has all along continued, and now reaches from W. to E by S. its greateſt Height about 8°.

Observation XXI. 9^h 35′.

The bloody Knot wholly vaniſhed; though ſeveral of the deſcending Striæ remain entire, and in many Places Parts of others, all of the ſame Direction, and a fainter Colour than before. The Sky is perfectly calm and ſerene.

Observation XXII. 9^h 42′.

The Northern Regions retain a bright *Aurora*, interſperſed with a reddiſh Caſt. From the Zenith is diffuſed a very extenſive red Vapour, reaching to the Southward near 30° from the Zenith, and from thence converging towards the Eaſtern and Weſtern Horizon, where it meets, the one E by S. and the other W S W.

The

The Southern Edge was of the deepeſt Red, and the moſt diſtinguiſhed Redneſs W S W. There appeared a falling Star S W. of a conſiderable Duration.

Observation XXIII. 10h 2′.

The Meteor much advanced to the Southward, its greateſt Height being not above 40° from the Horizon: Its horizontal Bounds E S E. and W by S. Its Redneſs much abated; but the *Aurora* diffuſed every where throughout the Scene, as conſpicuous to the South as towards the North Parts of the Zenith; which was an uncommon Sight. The Sky was now remarkably hazy, and full of Vapours.

Observation XXIV. 10h 18′.

The *Aurora* advanced conſiderably to the Southward of the red Vapour, which now is much diluted, about 20° in Breadth, a Part of it at leaſt 50° to the Southward of the Zenith, and tapering towards the Eaſtern and Weſtern Horizon, where the Bounds are much the ſame as before.

Observation XXV. 10h 25′. Fig. 7. *in which Z denotes the Zenith, and* N. E. S. W. *the Horizon.*

The *Aurora* ſeparated from the reddiſh Vapour conſiderably, in the upper Parts, though joined in the Horizontal, and not above 25° from the South Horizon. Not any diſtinguiſhable Red to the Northward, but an Arch of the *Aurora* of much the ſame Height, though much inferior in its horizontal Meaſure. The Southern and Northern *Aurora* each

very bright. There were ſeveral temporary Flaſhes in many Parts of the red Vapour. At this Juncture the *Aurora* ſeemed to appertain as much to the Southern as Northern Horizon; and the Redneſs conſiderably more: But there was a great Difference juſt towards the Horizons; the one being covered with the duskiſh Vapour ſo often mentioned, and the other appearing of its natural Blue.

OBSERVATION XXVI. 10h 35′.

The Appearance over, excepting a reddiſh Caſt to the Eaſtward, and a faint *Aurora* in the Northern Regions, of but ſmall Extent from the duskiſh Horizontal Vapour.

OBSERVATION XXVII. 11h 35′.

There have not been any remarkable Phænomena ſince the laſt. The Northern *Aurora*, with the duskiſh Vapour, ſtill continue, and I think as evident as at any of the foregoing Periods.

Here I ended my Obſervations. I am informed by others, who were occaſionally on the Water, that its Beginning was juſt after Sun-ſet, in the Form of an extended darkiſh Cloud riſing Northward; a few Minutes after the Appearance of which, there was, towards the Eaſtern and Weſtern Regions, a very diſtinguiſhable Tincture of Red. And the next Change was my firſt Obſervation.

OBSERVATION XXVIII. 11h 45′. FIG. 8.

It appeared in a new and very ſurprizing Form. The Edge of the horizontal Vapour was ſtrongly illumnated,

luminated, as though it had been fired; and this was in Height about 8°. From hence aroſe up continually, following one another, very extenſive horizontal Columns of a bright Flame-colour, which in ſcarce a ſecond of Time reached ſome to 40°, others above 60° of Altitude, and many to the intermediate Altitudes. Each of theſe Columns were as though an horizontal Train of Gunpowder had been ſuddenly fired, and the Flaſhes regularly propagated to ſuch enormous Heights in an horizontal Poſture. And there were innumerable Succeſſions of theſe riſing Flaſhes, the Phænomenon continuing nearly a quarter of an Hour. This Compariſon will alſo illuſtrate ſeveral other Particulars at this Juncture. Sometimes there were ſeveral of theſe Flaſhes aſcending together, at a little Diſtance from one another, as though there had been ſeveral horizontal Trains ſucceſſively and almoſt inſtantaniouſly kindled after one another. Sometimes the riſing Line of Light would be continued horizontally throughout the whole Scene, in other Places three quarters, an half, one third, a quarter, *&c.* of the ſame Length, as though theſe Trains had been unequally extended. Sometimes the Flaſh would begin in the Middle, and run kindling to the Extreams: Then, at one Extream, moving towards the other; and at other Times in more Places than one: But in all theſe Varieties, the horizontal Motions ceaſed, and the whole became one uniform Line before it had paſſed the enkindled Edge of the Cloud, which was not above 8°, as I obſerved before. All which may be well repreſented by the aforeſaid Trains of inflamable Matter, ſometimes enkindled in one Place, ſometimes in another,

another, but always propagated through the whole Train, with ſo ſwift a Motion, that there could be no conſiderable Difference as to the Height of one Part above another. The greateſt Extent of theſe horizontal Flaſhes was from N W. to NE. After theſe Phænomena the Meteor aſſumed its uſual Form; *viz.* a bright *Aurora* ſettled upon a duskiſh horizontal Vapour.

Observation XXIX. 2h.

The Meteor was again formed into much the ſame Form as was deſcribed in Obſervation the twentieth, but of fainter Colours conſiderably. It vaniſhed alſo again in the ſame manner.

Observation XXX. 6h 30′.

The *Aurora* contininued till Day-light; and the Phænomena, at different Times, and without any certain Periods, were much the ſame as I have deſcribed in one or another of the foregoing Articles.

I ſhall conclude theſe Notes, by obſerving, that the Day before this Meteor was very warm for the Seaſon, though early in the Morning there was a very conſiderable Hoar-Froſt. The Morning following was remarkable for an abundant Dew. The Temper of the Air much the ſame as the preceding Day. About Eight o'Clock the Heavens fair and calm. Barom. 30. 1. Therm. $\frac{38}{100}$.

You may obſerve, that in the Figures I have attempted the *Stereographic Projection* of the moſt conſiderable Scenes, which may be a conſiderable Aſ-

ſiſtance

ſiſtance to the Imagination; though I think the Expreſſions do not abſolutely require any Schemes.

I have compared theſe Obſervations with what I could find relating to the *Aurora Borealis* in the *Philoſophical Tranſactions, &c.* and think there are few Particulars mentioned there, but what occurred in this wonderful Inſtance; ſome that are rare confirmed, and a few altogether new; but the chief Advantage, I ſuppoſe, in theſe Notes, is the Proceſs, Criſis, and Decay, which is ſo obvious in many of the moſt remarkable Scenes.

I have nothing more at preſent, than the Pleaſure of ſtiling myſelf,

Your moſt Obedient Humble Servant,

ISAAC GREENWOOD.

II. *An Account of the ſame* Aurora Borealis, *by Mr.* Richard Lewis; *communicated in a Letter to Mr.* Peter Collinſon, *F. R. S.*

Annapolis in *Maryland, Dec.* 10, 1730.

SIR,

WE were entertained with a Phænomenon on the 22d of *October* laſt; which, as it was never obſerved before in this Quarter, was very ſurprizing to moſt People.

About

About Six at Night the North Part of the Hemiſphere appeared of a faint Red, the Horizon was very dusky, and this Redneſs was bounded above by a very dark Cloud.

As the Night advanced this Meteor reddened, till it was of as deep a Colour as Blood; and it ſpread itſelf to the North Eaſt. It continued all Night, but about Two in the Morning, I obſerved that it ſent forth two and three Streams from its North Part, of a whitiſh Colour, which ſhot up to the Zenith. Theſe Emanations looked much like the Rays of the Sun, when they paſs through a dark Cloud, when its ſaid to be drawing Water. I took it to be an *Aurora Borealis*, but it appeared much fainter than thoſe I have ſeen in *England*.

Dr. *Samuel Chew* at *Maidſtone*, tells me, that he has for ſome Days paſt, at Morning and Evening, obſerved ſeveral Spots in the Sun, very plainly with his naked Eye, ſome of which ſeemed very large.

III. *A new and exact Table collected from ſeveral Obſervations taken from the Year* 1721 *to* 1729, *in nine Voyages to* Hudſon's Bay *in* North-America, *by Captain* C. Middleton; *ſhewing the* Variation of the Compaſs *according to the Latitudes and Longitudes under-mentioned, accounting the Longitude from the Meridian of* London. *Communicated by Mr.* Benj. Robins, *F. R. S.*

Lat.		Long.		Variat.			Lat.		Long.		Variat.		
D.	M.	D.	M.	D.	M.		D.	M.	D.	M.	D.	M.	
50	00	2	East	12	00		50	00	16	00	15	00	Obſ.
49	30	0	00	12	00		51		ditto		15		Obſ.
50	00	2	Weſt	13	00	Obſ.	52		ditto		16		Ac.
50	00	4	00	13	00	ditto	53		ditto		16		
50	00	6	00	13	00	ditto	54		ditto		17		Obſ.
51	00	8	00	14	00	ditto	55		ditto		18		Ac.
51	00	14	00	14	00	ditto	56		ditto		18		
52	00	12	00	15	00	Ac.	57		ditto		19		
53	00	12	00	ditto.		ditto	58		ditto		19		Obſ.
54	00	12	00	ditto.		ditto							
55	00	12	00	16	00	ditto	50	00	18	00	17	00	Obſ.
56	00	12	00	16	00	Obſ.	51		ditto		17		
57	00	12	00	17	00	ditto	52		ditto		17		
58	00	12	00	17	00	ditto	53		ditto		17		
59	00	12	00	18	00	ditto	54		ditto		18		
							55		ditto		18		Ac.
50	00	14	00	14	00	Obſ.	56		ditto		18		
51	00	ditto		14			57		ditto		19		
52		ditto		15			58		ditto		19		Obſ.
53		ditto		15		Ac.	59		ditto		19		
54		ditto		16		Obſ.							
55		ditto		16		Obſ.							
56		ditto		17		Obſ.							
57		ditto		17		Obſ.							
58		ditto		18		Obſ.							
59		ditto		18		Ac.							

Lat. D.	M.	Long. D.	M.	Variat. D.	M.	
50	00	20	00	18	00	Ac.
51		ditto		18		
52		ditto		18		Obſ.
53		ditto		19		
54		ditto		19		
55		ditto		19		
56		ditto		19		Ac.
57		ditto		19		
58		ditto		20		
59		ditto		21		Obſ.
50	00	22	00	19	00	Obſ.
51		ditto		19		Ac.
52		ditto		19		
53		ditto		20		Obſ.
54		ditto		20		Ac.
55		ditto		20		
56		ditto		20		
57		ditto		20		
58		ditto		21		Obſ.
59		ditto		21		
50	00	24	00	20	00	Ac.
51		ditto		20		
52		ditto		20		
53		ditto		21		Obſ.
54		ditto		21		
55		ditto		21		Ac.
56		ditto		21		
57		ditto		21		Obſ.
58		ditto		22		
59		ditto		22		

Lat. D.	M.	Long. D.	M.	Variat. D.	M.	
50	00	26	00	21	00	Obſ.
51		ditto		21		
52		ditto		21		Ac.
53		ditto		21		
54		ditto		22		Obſ.
55		ditto		22		
56		ditto		22		Ac.
57		ditto		23		Obſ.
58		ditto		23		
59		ditto		23		
50	00	28	00	22	00	Ac.
51		ditto		22		
52		ditto		22		
53		ditto		23		Obſ.
54		ditto		23		
55		ditto		23		Ac.
56		ditto		23		
57		ditto		24		Obſ.
58		ditto		24		
59		ditto		24		
50	00	30	00	23	00	Ac.
51		ditto		23		
52		ditto		23		
53		ditto		24		Obſ.
54		ditto		24		Ac.
55		ditto		24		
56		ditto		24		
57		ditto		25		Obſ.
58		ditto		25		
59		ditto		25		Ac.

Lat. D. M.	Long. D. M.	Variat. D. M.	
50 00	32 00	24 00	Ac.
51	ditto	24	
52	ditto	24	Obſ.
53	ditto	24	
54	ditto	25	
55	ditto	25	Ac.
56	ditto	25	
57	ditto	26	Obſ.
58	ditto	26	Ac.
59	ditto	26	Obſ.
50 00	34 00	25 00	Obſ.
51	ditto	25	Ac.
52	ditto	25	
53	ditto	25	
54	ditto	26	Obſ.
55	ditto	26	Obſ.
57	ditto	26	
58	ditto	27	Ac.
59	ditto	27	
50 00	38 00	27 00	
51	ditto	27	Obſ.
52	ditto	27	Ac.
53	ditto	28	Obſ.
54	ditto	28	
55	ditto	28	Ac.
56	ditto	28	
57	ditto	29	Obſ.
58	ditto	29	
59	ditto	30	Obſ.

Lat. D. M.	Long. D. M.	Variat. D. M.	
50 00	40 00	28 00	Ac.
51	ditto	28	Obſ.
52	ditto	28	
53	ditto	29	
54	ditto	29	Ac.
55	ditto	29	
56	ditto	29	
57	ditto	30	Obſ.
58	ditto	30	
59	ditto	30	
51 00	42 00	29 00	Obſ.
52	ditto	29	
53	ditto	30	
54	ditto	30	
55	ditto	30	Ac.
56	ditto	30	Obſ.
57	ditto	31	
58	ditto	31	
59	ditto	31	
52 00	44 00	30 00	Obſ.
53	ditto	31	
54	ditto	31	Ac.
55	ditto	31	
56	ditto	31	
57	ditto	32	Obſ.
58	ditto	32	
59	ditto	32	Ac.

Lat. D.	M.	Long. D.	M.	Variat. D.	M.	
53	00	46	00	31	00	Ac.
54		ditto		32		Obſ.
55		ditto		32		
56		ditto		32		Ac.
57		ditto		33		Obſ.
58		ditto		33		
59		ditto		33		
56	00	48	00	32	00	Obſ.
57		ditto		32		
58		ditto		32		
59		ditto		34		
60		ditto		34		
61		ditto		34		
57	00	50	00	33	00	Obſ.
58		ditto		33		
59		ditto		33		
60		ditto		34		
61		ditto		35		
58	00	52	00	34	00	Obſ.
59		ditto		34		
60		ditto		34		
61		ditto		35		
62		ditto		35		
58	00	54	00	34	00	Obſ.
59		ditto		35		
60		ditto		36		
61		ditto		36		
62		ditto		36		
58	00	56	00	36	00	Obſ.
59		ditto		36		
60		ditto		36		
61		ditto		37		
62		ditto		37		

Lat. D.	M.	Long. D.	M.	Variat. D.	M.	
58	00	58	00	36	00	Obſ.
59		ditto		37		
60		ditto		37		
61		ditto		37		
62		ditto		38		
63		ditto		38		
58	00	60	00	37	00	Obſ.
59		ditto		38		
60		ditto		38		
62		ditto		38		
63		ditto		39		
58	00	62	00	38	00	Obſ.
59		ditto		39		
60		ditto		39		
61		ditto		39		
62		ditto		40		
59	00	64	00	39	00	Obſ.
60		ditto		39		
61		ditto		39		
62		ditto		40		
60	00	66	00	40	00	Obſ.
61		ditto		41		
62		ditto		43		
59	00	68	00	40	00	
60		ditto		43		
61		ditto		44		
62		ditto		47		
60	00	70	00	43	00	
61		ditto		44		
62		ditto		47		

Lat.	Long.	Variat.	
D. M.	D. M.	D. M.	
00	72 00	42 00	Obſ.
	ditto	43	
	ditto	48	
00	74 00	41 00	
	ditto	48	
00	76 00	41 00	
	ditto	47	
	ditto	49	
00	78 00	40 00	
	ditto	42	
	ditto	49	
00	80 00	40 00	
	ditto	49	
00	82 00	38 00	Obſ.
	ditto	39	
	ditto	40	
	ditto	42	
	ditto	44	
00	84 00	19 00	
	ditto	20	
	ditto	21	
	ditto	22	
	ditto	23	
	ditto	24	
	ditto	25	
	ditto	26	
	ditto	27	
	ditto	27	
	ditto	28	
	ditto	29	
	ditto	30	
	ditto	40	

Hudſon's Streights.

In Hudſon's Bay.

Lat.	Long.	Variat.	
D. M.	D. M.	D. M.	
55 00	86 00	22 00	Obſ.
56	ditto	23	
57	ditto	24	
58	ditto	25	
59	ditto	26	
60	ditto	27	
56 00	88 00	22 00	
57	ditto	23	
58	ditto	24	
59	ditto	25	
60	ditto	26	
57 00	90 00	21 00	
58	ditto	22	
59	ditto	23	
60	ditto	24	

In Hudſon's Bay.

Note, *The Letters* Obſ. *are the Obſervations, and the Letters* Ac. *are by Eſtimation.*

IV. *Obſerva-*

IV. *Obſervations on the* Weather, *in a Voyage to* Hudſon's North-America, *in the Year* 1730, *by Mr.* Chriſtopher dleton. *Communicated by the ſame.*

D.	M.	Barom. Altitud.	Therm. Altitud.	Lat. North.	Long. Weſt.	Variat. Weſt.	Obſ.	Wind.	Weather.
June	4	27	25	59° 12′	4° 44′	17° 00	Obſ.	S W.	Cloſe.
	5	22	25	59 38	5 11	16 00	Obſ.	S W to N W.	Rain, and ſtormy Wind
	6	21	24	59 58	5 57	17 00		W S W.	Rain, and freſh Gales.
	7	22	23	59 22	7 06	17 20		N W to S S W.	Rain and ſqually, with
	8	22	22	59 38	8 39	18 00	Obſ.	S W to S E.	Much Rain all Night, fair
	9	23	22	59 54	8 47	18 00		N E.	Very cloudy.
	10	20	22	59 14	10 14	18 00		North.	Firſt Part ſqually, latter
	11	22	22	58 35	11 23	18 00		N W.	Squally with Rain.
	12	22	25	57 21	12 20	18 00		N W.	Cloudy, with ſmall Rain
	13	22	24	56 31	13 13	18 00		N W.	Squally.
	14	25	25	56 00	14 22	18 00		N W to S.	Firſt Part ſqually, latter
	15	24	25	55 53	17 02	18 00	Obſ.	E to N.	Squally, and freſh Gales
	16	20	23	55 42	18 16	18 00		N E to S W.	Cloudy.
	17	19	23	56 21	18 47	18 00		S W to N W.	Rain and ſtormy.
	18	18	22	55 22	19 34	18 30		N W.	Squally, with Rain.
	19	20	23	55 42	21 14	19 00		N N E to W b S.	Cloudy with Rain, unce
	20	21	24	56 51	21 31	19 30		N W.	Freſh Gales, and foggy.
	21	21	24	57 23	21 54	20 00		W N W to W b S.	An hard Rain, and ſtorm
	22	21	24	57 00	22 01	20 00		N E to W.	Hard Gales for the moſt
	23	21	24	57 56	23 52	21 00		W S W.	Freſh Gales, but cloudy.
	24	23	24	58 16	24 09	22 00		W to W N W.	Hard Gales, cloudy.
	25	24	23	57 40	24 38	22 00	Obſ.	W N W to S W.	Cloudy, little Wind.
	26	23	23	57 57	25 33	22 00		S W.	Little Wind, and foggy.
	27	22	22	58 47	28 25	23 00		S W to W.	Foggy, and ſqually.
	28	23	22	58 39	29 31	23 00		W to N N W.	Freſh Gales, Rain.
	29	24	21	58 28	29 45	23 20		N W to W.	Moderate and calm.
	30	25	22	58 00	30 38	24 00		W to S W.	Moderate, cloudy.
July	1	22	22	58 25	31 29	24 00	Obſ.	W S W.	Moderate and clear.
	2	20	22	59 13	32 54	25 00		S W to W.	Frequent Squalls, ſome
	3	24	21	59 03	33 14	25 00	Obſ.	W N W.	Moderate and cloudy.
	4	25	22	58 54	33 30	25 00		W N W.	Fair, ſometimes calm.
	5	20	22	58 43	35 44	26 00	Obſ.	S S E.	Sometimes calm. Fair.
	6	20	22	58 26	37 25	26 30		S S E to W.	Stormy, and Rain.
	7	21	20	58 06	39 30	27 30	Obſ.	W N W to S E.	Moderate. Little Wind
	8	22	20	58 03	42 38	27 00		S to S W.	Foggy.
	9	24	22	57 34	43 23	27 00		N N W.	Foggy. Little Wind.
	10	24	24	57 43	45 25	27 00	Obſ.	N N W.	Freſh Gales and clear.
	11	28	28	58 11	46 47	27 00		W b S to N N W	Cloudy, with ſmall Rain
	12	29	26	57 34	48 17	28 00	Obſ.	N N W to S S W.	Fair.
	13	29	26	58 00	50 48	29 00		S W.	Hazy.

Barom. Altitud.
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Barom. Altitud.	Therm. Altitud.	Lat. North.	Long. West.	Variat. West.	Obſ.	Wind.	Weather.
28	26	58° 53′	53° 20′	31° 00′		SW to W b S.	A thick Fog.
33	35	58 56	55 18	32 00		W N W to N W.	Small Rain, and ſqually.
38	37	59 06	55 33	34 00		N b W to N W.	Several Iſles of Ice.
40	38	58 50	56 04	35 00		N N W.	Fair and clear. Very cold.
41	39	58 53	56 43	37 00	Obſ.	N W to W S W.	Very cold. Much Ice.
40	38	59 45	58 03	36 00	Obſ.	N W to W S W.	Fair and clear.
40	38	60 01	58 27	37 00		N N W.	Fair and moderate.
42	38	59 51	59 59	37 00		N N W to S E b S	Fair.
43	38	61 16	62 09	38 00		S S E.	Hazy.
43	39	61 50	63 34	40 00		S E.	In *Hudſon's Streights.*
42	38	62 11	72 32	42 00	Obſ.	S E.	Foggy.
40	35	63 11	76 22	40 00		S E.	Rainy and cold.
41	37	63 12	78 04	40 00	Obſ.	S E.	Little Wind, and clear.
39	39	63 09	78 43	42 00		Eaſt.	Little Winds, ſometimes calm.
37	38	62 10	81 12	40 00		S E to W b N.	Squally, with much Rain.
35	37	60 49	82 21	36 00		W b N to N E.	Gentle Rain. A freſh Gale.
38	36	58 24	84 09	33 00		N to N N W.	Much Ice all round.
40	38	56 51	84 27	28 00		N W.	Fair and clear. Ice ſtill.
43	39	56 15	83 46	24 00	Obſ.	N W to W S W.	Fair. Ice as before.
42	38	56 20	84 16	24 00	Obſ.	S b W.	Merc^{y}. incloſed in Ice. Fair.
40	38	56 27	83 44	24 00		South.	Still in Ice. Freſh Gales.
38	36	56 20	83 01	24 00		S W.	Foggy, and much Ice.
38	35	56 15	83 24	24 00		E S E.	Much Rain, and foggy.
	40	37	56 00	82 46	24 00		W S W.	Fair and moderate.
	40	39	55 08	82 43	24 00		E N E.	Lightning with ſome Rain.
	38	36	55 11	82 43	24 00		N to N N W.	Fog. Freſh Gales. Jambed in Ice.
	38	36	55 16	82 43	24 00		N N W.	Froſt and calm.
	34	31	55 22	82 40	24 00		South.	Fair and pleaſant.
	34	32	55 11	84 20	24 00		S W to N W.	Moderate.
	31	30	55 06	84 36	24 00		N N W to S b E.	Moderate and fair.
	27	30	55 15	84 52	24 00		S to S S W.	A freſh Gale. Much Ice.
	26	30	55 20	84 34	24 00		S b W.	Hard Gale. Thunder and Rain.
	26	27	54 44	84 34	24 00		W N W to N W.	Freſh Gales. In Ice.
	29	27	54 28	84 34	24 00		N W to N.	Moderate and fair.
	26	27	53 54	84 56	24 00		N E to S b E.	Clear of Ice. Fair.
	25	25	53 56	84 58	24 00		W b N to W S W	A freſh Gale. Clear of Ice.
	25	24	53 44	84 57	24 00		W S W to W b N	Moderate and fair.
	28	26	53 09	85 00	24 00		W b S to S E b S.	Moderate and fair.
	28	25	52 31	85 30	23 00	Obſ.	E to N E.	Moderate.

In ALBANY *Road.*

2	27	25	50°	29′	85°	20′	23° 00′	N W to S E.	Moderate and fair.
3	26	22						S. W.	Dry. Somewhat cloudy.
4	26	21						W N W.	Merc^{y}. at a Stand.

The Time I was on Shore not obſerved. From ALBANY.

2	25	20	53°	56′	0°	30′ E	24° 00′	S S W.	Hazy, but ſmall Gales.

Sept.

From the BEAR Islands.

D.	M.	Barom. Altitud.	Therm. Altitud.	Lat. North.	Long. West.	Variat. West.	Obſ.	Wind.	Weather.
Sept.	3	35	32	54° 22′	0° 7′ W	24° 00′		SW to NEbN.	Merc^y. ſuddenly falls to fr
	4	40	37	55 45	0 49 W	25 00		NNE to WSW	Hard Froſt. Fair.
	5	37	36	56 35	2 26 W	26 00		E b N to NE.	Cold Air. Squally, and f
	6	37	35	56 57	3 04 W	26 00		N E.	A wet Fog.
	7	37	34	56 45	1 22 W	26 00		N E.	Moderate Gales.
	8	38	36	57 06	3 26 W	26 00		N E b N.	Freſh Gales.
	9	36	36	58 08	3 02 W	28 00		N b E to W.	Foggy.
	10	36	38	60 25	2 02 W	33 00		WSW to NW b N	Freſh Gales. Wet Fog.
	11	35	38	61 49	0 42 E	38 00		N b W to N b E.	Moderate, but cold Air.
	12	34	37	62 33	0 51 E	42 00	Obſ.	N b E to N N W.	Freſh Gales, ſqually, wi
					From DIGGS.				
	13	33	34	63° 20′	1° 20′ E	43° 00′	Obſ.	All round.	Sometimes calm.
	14	32	35	63 03	2 34 E	40 00		S b E to N N W.	Squalls, Showers of Snow
	15	32	36	62 09	9 19 E	42 00		N W to N N W.	Stormy, frequent Showe
					From BUTTON's Islands.				
	16	31	35	51° 10′	0° 29′ E	39° 00′		N b W to N N W	Many Iſles of Ice and Sn
	17	30	34	60 35	6 09	34 00		N W to N.	Freſh Gales, and frequen
	18	30	34	58 52	10 39	34 00		N N W to N N E	Squally, with Showers
	19	30	35	57 54	14 06	32 00		N W.	Squally, with Hail.
	20	30	34	57 28	16 15	30 00		N W to S b W.	Squally, with Hail and
	21	31	33	57 38	18 24	28 00		S b W to W S W.	Hard Squalls, ſome Ra
	22	30	35	56 19	22 27	25 00		W S W to N W.	Stormy, with ſome Hail
	23	30	36	54 46	27 43	22 30		N W.	An hard Storm, with H
	24	29	36	53 28	32 28	21 00		W N W to S S W	High Winds, with Hail.
	25	31	35	53 34	35 16	19 00		S to W S W.	A Storm. Wind and R
	26	33	34	52 46	36 27	18 00		W to S W.	More moderate. Freſh G
	27	33	34	52 21	39 11	17 00		S S W to N W.	Squalls of Rain.
	28	32	34	50 35	42 10	16 00		N. to W b S.	Frequent Showers of R
	29	30	33	50 41	46 23	15 00		S W b W to S S W.	Very ſqually, with Lig
	30	32	32	50 07	49 09	14 00		S W.	An hard Gale, with Ra
Oct.	1	35	31	49 26	51 57	14 00		S W to N N W.	More moderate and fair
	2	30	33	49 30	53 45	14 00		N E.	Moderate and fair. Li
	3	25	30	49 56	54 34	13 00		S E.	Freſh Gales, with Rain
	4	25	30	49 19	54 10	13 00		S to E.	A Storm. Wind and
	5	25	29	49 47	53 50	13 00		E b S.	An hard Storm, with R
	6	29	28	50 10	53 26	13 00		E S E.	Stormy, with Thunder.
	7	31	27	49 58	53 48	13 00		Eaſt.	More moderate. Cloud
	8	32	29	49 21	55 19	13 00		E to S S W.	Foggy, with ſome Rai
	9	32	30	49 45	58 49	13 00		W S W to S b W.	Freſh Gales, with Rai
	10	33	28	49 56	61 37	13 00	Obſ.	S to S S W.	Fair & moderate for the

Off *Plymouth.*

Theſe Obſervations were made by Mr. *John Patrick*'s new Quickſilver Marine Baro

Note, The Altitude of the Spirits in the Barometer and Thermometer were take

The Account of Wind and Weather at Sea is from Noon to Noon.

V. *A Letter from Mr.* Triewald, *Director of Mechanicks to the King of* Sweden, *and F. R. SS. of* England *and* Sweden, *to Sir* Hans Sloane, *Bar^t. Pres. R. S. relating to an extraordinary Instance of the almost instantaneous* freezing of Water; *and giving an Account of* Tulips, *and such* bulbous Plants, *flowering much sooner when their Bulbs are placed upon Bottles filled with Water, as in* TAB. II. *than when planted in the Ground.*

Most honoured SIR,

I HAVE at present to communicate to you a somewhat strange Accident, which produced as unexpected a Phænomenon. The 15th of *December* last coming into the Hall, where my *Apparatus* is placed, in the Palace of the Nobility at *Stockholm*, the Weather being very cold, I feared that the Glass for shewing the Experiment with the *Cartesian Devils* (or those glass Figures in Water, which by the Pressure of the Air on the Surface of the Water, are made to change their Places, and sink to the Bottom of the Glass) would be in Danger, if the Water should freeze in the same. I took it down from the Shelf, and was well pleased to see the Water in a fluid State; but before I would empty the Glass, as some Friends that were present had not seen that Experiment, I placed my Hand on the Bladder tied on the Top of this Cylindrical Glass, which was of a pretty large Size, sixteen

Inches high, and three Inches and a half Diameter, containing three glaſs Figures: In that very Inſtant, and in the Space of a Second of Time, I found all the Water changed into Ice; when in that Time two of the Figures had reached very near the Bottom, but the third, as well as they, fixed in the Middle of the Glaſs, ſurrounded with Ice as tranſparent as the Water itſelf before it congealed. This is, in a few Words, the Matter of Fact; but the Reaſon why the whole Body of Water, in ſuch a ſhort Space of Time, ſhould turn into Ice, is, in my humble Opinion, not ſo eaſily to be accounted for; and rather than offer any Solution of mine, ſhall leave the ſame to that ingenious Gentleman Dr. *Deſaguliers*.

In *September* laſt I placed ſome Leeks of *Tulips*, and other Flowers, after ſuch a manner in Water as the Figures in TAB. II. repreſent; at which Time I put into each Glaſs two Grains of *Saltpetre*. Theſe Glaſſes I kept in my Study, ſometimes on a Shelf, at other times before the Window. In a Fortnight's Time I begun to find that they ſtruck new Roots; the latter End of *November* they put forth Leaves, and in *January* they all flowered, as well as if they had been on a Garden-bed; whereas in Gardens we ſeldom ſee, in this Country, *Tulips* before the latter End of *May*, and this Year ſcarce ſo ſoon, the Ground being yet covered with Abundance of Ice and Snow.

Though theſe Experiments ſeem to be calculated for nothing but Delight, yet I think they have furniſhed me with ſome Lights, as to the Riſe of the Sap in Plants, which I will forbear mentioning till the

the next Winter gives me an Opportunity of reiterating thoſe and ſome other Experiments.

I am, with the higheſt Eſteem and Reſpect,

Moſt Honoured SIR,

Stockholm, April the 4th, 1730.

Your moſt Obedient and moſt Humble Servant,

FR. TRIEWALD.

VI. *An Account of ſome Experiments, relating to the Flowering of* Tulips, Narciſſus's, &c. *in Winter, by placing their Bulbs upon Glaſſes of Water, made by Monſ.* Triewald, *Director of Mechanicks at* Stockholm, *and F. R. SS. of* England *and* Sweden, *and read before the* Royal Society May *the 7th,* 1730, *as they were tried the next Seaſon by* Philip Miller, *F. R. S. Gardiner to the worſhipful Company of* Apothecaries, *at their Botanick Garden in* Chelſea.

THE Glaſſes marked Numb. 1, were Roots of a *Hyacinth*, commonly known by the Name of *Pulchra*. Numb. 2. were Roots of the common *Oriental blue Hyacinth*. The Flowers of theſe were

not ſo large as they are commonly produced when planted in a Bed of Earth; but this was occaſioned by the Bulbs dividing into ſeveral Off-ſets, each of which are as ſo many different ſmall Roots, ſending forth Stems and Leaves. Numb. 3, was a Bulb of a *Tulip*, which though placed on the Glaſs of Water at the ſame Time as the *Hyacinths*, yet was not likely to flower in a Month. Numb. 4, was a Root of *Narciſſus*. This was alſo as backward as the *Tulip*, though put upon the Water at the ſame Time with the *Hyacinths*. Theſe Roots were placed upon the Glaſſes the Beginning of *November* laſt; at which Time I put them into a Green-Houſe, where the Air was kept conſtantly in a temperate Warmth. The Glaſſes were filled with common *Thames* Water, ſo near to the Top, that when the Bulbs were placed upon the Glaſſes, it might be about a quarter of an Inch below the Bottom of the Bulbs. Into thoſe Glaſſes marked Numb. 5, I put a ſmall Quantity of common Garden Mould, to try whether that would forward their Flowering, or encreaſe their Strength: But I found that all the Roots which were placed on thoſe Glaſſes, into which the Earth was put, were at leaſt a Fortnight later than the others before their Fibres were emitted, and their Progreſs has been ſince much ſlower. I alſo obſerved that the Water, in thoſe Glaſſes where the Earth was put, did not waſte above half ſo faſt, as it did in thoſe Glaſſes where there was none; which, I conceive, might be occaſioned by the terreſtrial Matter mixing with the Water, and ſo rendering it thicker, and leſs capable of being attracted by the Plants, or evaporating by the Heat. And from thoſe Glaſſes, where the

Bulbs

Bulbs did not exactly cover their Necks, the Water evaporated much faſter than from thoſe where the Bulbs did entirely cover the Tops of the Glaſſes, ſo as to leave no Vacuities round them.

In about a Month after the Roots were put upon the Glaſſes of Water they began to put out their Fibres into the Water; but they did not begin to put forth their Leaves, until their Fibres were extended all over the Glaſſes, and were almoſt as full grown as at preſent. When their Leaves began to appear, the Buds of the *Hyacinth-Flowers* were ſoon viſible, and in about three Weeks Time were fully blown. The *Tulips* and *Narciſſus's* being much backwarder than the *Hyacinths* (as they always are when planted in a Garden) theſe ſhould always be placed upon the Glaſſes of Water ſix Weeks or two Months earlier in the Seaſon than the *Hyacinths*, when they are deſigned to flower at the ſame Time; and the *Præcoces* (or early blowing) *Tulips* ſhould always be choſen for this Purpoſe.

By this Method a Perſon who has not a Garden, may have ſome of theſe Flowers growing in his Chambers, where, if they are not kept too cloſe from the Air, or in a Place too warm, they will flower almoſt as well as in a Bed of Earth, provided the Roots are good, and are every Year renewed; eſpecially the *Tulips*, becauſe they every Year do form new Bulbs, the old ones being always exhauſted in nouriſhing the Leaves and Flowers, a new Bulb is annually produced by the Side of the Flower-ſtem. The *Hyacinths* I have obſerved to flower two Years ſucceſſively upon Glaſſes of Water; but their Flowers were very weak

the

the ſecond Year. So that it is much the better Way to have freſh Roots every Year.

I am with the greateſt Reſpect,

GENTLEMEN,

Chelſea, Feb. 4th, 173$\frac{0}{1}$.

Your moſt Obedient Aſſociate,

PHILIP MILLER.

VII. *A Letter from* T. Madden, *M. D. of* Dublin, *to* Cromwell Mortimer, *M. D. R. S. Secr. giving an Account of* two Women being poiſoned *by the* SIMPLE DISTILLED WATER OF LAUREL-LEAVES, *and of ſeveral Experiments upon Dogs; by* which *it appears that this* LAUREL-WATER *is one of the moſt* DANGEROUS POISONS *hitherto known.*

SIR,

A Very extraordinary Accident that fell out here ſome Months ago, has diſcovered to us a moſt dangerous Poiſon, which was never before known to be ſo, though it has been in frequent Uſe among us. The Thing I mean is a Simple Water, diſtilled from the Leaves of the *Lauro-ceraſus*. The Water is at firſt

firſt of a Milky Colour, but the Oil which comes over the Helm with it, being in a good Meaſure ſeparated from the Phlegm, by paſſing it through a Flannel-Bag, it becomes as clear as common Water.

It has the Smell of the bitter Almond, or Peach-Kernel, and has been for many Years in frequent Uſe among our Houſewives and Cooks, to give that agreeable Flavour to their Creams and Puddings. It has alſo been much in Uſe among our Drinkers of Drams; and the Proportion they generally uſe it in, has been one Part of *Laurel-Water* to four of *Brandy*.

Nor has this Practice (however frequent) ever been attended with any apparent ill Conſequences, till ſome Time in the Month of *September*, 1728, when it happened that one *Martha Boyſe*, a Servant, who lived with a Perſon that ſold great Quantities of this *Water*, got a Bottle of it from her Miſtreſs, and gave it to her Mother *Anne Boyſe* as a very rich Cordial.

Anne Boyſe made a Preſent of it to *Frances Eaton* her Siſter, who was a Shopkeeper in the Town, and who, ſhe thought, might oblige her Cuſtomers with it. Accordingly in a few Days ſhe gave about two Ounces of the *Water* to a Woman called *Mary Whaley*, who had bought ſome Goods of her.

Mary Whaley drank about two Thirds of what was filled out, and went away. *Frances Eaton* drank the reſt. *Mary Whaley* went to another Shop to buy ſomewhat elſe, and in about a quarter of an Hour after ſhe had drank the *Water* (as I am informed) ſhe complained of a violent Diſorder in her Stomach. She was carried Home, and from that Time ſhe loſt her

Speech,

Speech, and died in about an Hour, without Vomiting, or Purging, or any Convulsion.

The Shopkeeper, *Francis Eaton*, sent Word to her Sister *Ann Boyse* of what had happened, who came to her upon the Message, and affirmed, that it was not possible the Cordial (as she called it) could have occasioned the Death of the Woman; and to convince her of it, she filled out about three Spoonfuls, and drank it. She continued talking with *Francis Eaton* about two Minutes longer, and was so earnest to persuade her of the Liquor's being inoffensive, that she filled out two Spoonfuls more, and drank it off likewise. She was hardly well seated in her Chair, when she died, without the least Groan or Convulsion.

Frances Eaton, who, as was before observed, had drank somewhat above a Spoonful, found no Disorder in her Stomach, or elsewhere; but to prevent any ill Consequence, she took a Vomit immediately, and has been well ever since.

Mary Whaley was buried without being examined by any one, that I can find, except the Coroner. I went to see *Ann Boyse* about Twenty-four Hours after her Death, but could not prevail to have her opened. She was about sixty Years old; her Countenance and Skin appeared well coloured, and her Features were hardly altered, so that she looked as one asleep. Her Belly was not swelled, nor had she any other external Mark of Poison.

This Accident brought into Discourse another of the like Nature which happened about four Years since in the Town of *Kilkenny*. A young Gentleman, Son to Mr. —— *Evans*, an Alderman of the Town,

Town, miſtook a Bottle of this *Laurel-Water* for a Bottle of *Ptiſan*. What Quantity he drank is uncertain, but he died in a few Minutes, complaining of a violent Diſorder in his Stomach. This Affair was not much regarded at that Time, becauſe he laboured under a Diſtemper, to which, or to an improper Uſe of Remedies, his Death was attributed by thoſe about him.

To ſatisfy myſelf farther as to the Effects of this Poiſon, I made ſome Experiments, in Conjunction with a few of my Friends, an Account of which follows.

I. *October* 3, 1728, We gave a large Setting-Dog three Ounces of *Laurel-Water* by the Mouth. In three Minutes after he had taken it, he began to be ſtrongly convulſed. His Convulſions continued about five Minutes; after which I untied him. He then fell into a moſt violent Difficulty of Breathing, which laſted about eight Minutes, and abated gradually; upon which he endeavoured to raiſe himſelf, but could not.

I tied him down once again, and gave him an Ounce and an half more, upon which he ſunk at once, and without any Return of his Convulſions, or Difficulty of Breathing, he expired in two Minutes.

Upon opening the Stomach, I found in it the whole Quantity of *Water* which he had taken; its Surface was covered with Froth, but it was not otherwiſe altered in its Colour, Conſiſtence, or Smell. The Inſide of the Stomach was not at all inflamed, nor was there any viſible Alteration in the *Tunica Villoſa*.

The Veins of the Stomach, all the *Meſaraick* Veins, and likewiſe the *Vena Cava*, were much diſtended with Blood; the *Arteries*, on the contrary, were remarkably empty. The *Liver* and *Gall-Bladder* were no Way altered. The *Kidneys* were unuſually full of Blood, and appeared of a bluiſh Colour, almoſt as deep as that of the Violet Plumb. Upon making an Inciſion into one of the *Kidneys*, the Blood flowed in much greater Plenty, and was more fluid than uſual. In the *Heart* there appeared nothing præternatural. The *Brain* was no way altered.

II. *October* 24, We gave an Ounce and an half of the ſame *Water* to a Bitch of a ſmaller Size. She was immediately let looſe, and in two Minutes ſhe loſt the Uſe of her Limbs. She attempted ſeveral Times to raiſe herſelf, and walk, but ſhe ſtaggered and reeled about, and then fell down. She repeated this without ceaſing about five or ſix Minutes. At laſt ſhe was violently convulſed, eſpecially in the Muſcles that extend the *Head* and *Spine*. About the Space of a Minute ſhe had that Sort of Convulſion called the *Opiſthotonos*, the Back of her *Head* being drawn almoſt to her *Tail*.

After this ſhe vomited plentifully, and her Convulſions ceaſed. She then lay ſtill for ſeven or eight Minutes, labouring for Breath (though not ſo violently as in the former Caſe) and foaming at the Mouth. We gave her an Ounce more of the *Water*; upon which her Difficulty of breathing encreaſed, and ſhe died in two Minutes.

Upon

Upon opening the *Abdomen*, the *Thorax* and the *Head*, we found every thing in the ſame State as in the former Inſtance.

III. *October* 25, We gave two Ounces of the *Water* to a Dog of the ſame Size with the former, which produced the like Appearances as in the foregoing Caſe. This Dog was dying half an Hour; for the Doſe was not repeated, becauſe he did not vomit up what he had taken. Upon opening him, we found every thing in the ſame State as in the former Inſtance.

IV. *October* 26, We gave two Drams and an half of the *Water* to a Dog of a middle Size, and immediately untied him. He then ran about the Room very briskly for about a Minute, and ſeemed to be no Way affected with it; yet he ſoon loſt the Uſe of his Limbs. He often attempted to raiſe himſelf, and walk, but ſtill fell down again before he had moved two Yards from the Place.

After this he vomited plentifully, conſidering that he had faſted 24 Hours, upon which he was ſeized with a Convulſion more violent than any of the former Dogs, eſpecially in the Muſcles that extend the *Head* and *Spine*. Theſe Convulſions continued about eight or ten Minutes; upon their ceaſing, he lay ſtill, breathing deeply, though regularly, and ſeemed to be aſleep. In about ten Minutes he raiſed himſelf, took ſome Food, and walked about tolerably well. We left him, and returning after three Hours, we found him perfectly recovered.

V. *October* 28, We injected an Ounce of the *Water* into the *Inteſtinum rectum* of a ſtrong Spaniel Dog, and let him looſe. In the Space of two Mi-

nutes he began to loſe the Uſe of his Limbs, and to ſtagger as the others had done. He was convulſed more violently than any of the reſt, and chiefly in the Muſcles of the *Neck* and *Spine*. The Muſcles of his *Eyes* were ſtrongly convulſed, which Appearance was not obſerved in the other Dogs. He foamed at the Mouth, yelled frequently, and breathed with more Difficulty than any of the reſt. His Convulſions continued twenty Minutes; upon their ceaſing he lay quiet, as though he ſlept, only that his Eyes were open. His Limbs were now grown perfectly paralytick.

We raiſed him up ſeveral Times, and offered to ſet him on his Legs, but he did not attempt to uſe them. He continued in this Way about fifteen Minutes longer, and then was ſeized with another violent Convulſion, which in five Minutes put an End to his Life.

Upon opening the *Abdomen*, we found the Veins of the *Stomach* and *Guts* very much diſtended with Blood, as in all the former Inſtances. In the *Heart*, *Lungs* and *Brain*, there was no viſible Alteration.

VI. *October* 30, We injected an Ounce and an half of the *Water*, diluted with three Ounces of common Water warmed, into the *Anus* of a ſmall Bitch. Before we could untie her ſhe was ſeized with Convulſions, and yelled much. She fell as ſoon as ſhe was looſed, and never after endeavoured to riſe. She had Convulſions, and great Difficulty of Breathing about two Minutes. She then lay ſtill, with her Limbs ſtiff and extended, about three Minutes; during which Time her lower Jaw was convulſed, and pulled alternately to and from the upper Jaw, with a very quick Motion.

After this her Limbs became paralytick, and ſhe gaſped for Breath about two Minutes longer. She was quite dead in ſeven or eight Minutes from the Injection of the Clyſter.

In the *Abdomen*, *Thorax* and *Brain* every thing appeared as uſual.

VII. *November* 2, We injected half an Ounce of the *Water*, diluted with three Ounces of common Water warmed, into the *Anus* of a ſmall Bitch. In the Space of four Minutes ſhe began to breathe with Difficulty. We let her looſe, but ſhe was not able to ſtand, or walk without ſtumbling. The Muſcles that extend the *Head* were convulſed, and her Fore-legs were affected for three or four Minutes with a *Tetanus*, but had no convulſive Motion. She vomited and purged plentifully. She did not yell, nor ſeem to ſuffer much Pain, nor did ſhe loſe her Senſes all the Time. In half an Hour ſhe recovered.

VIII. The next Day, we injected a Drachm of the *Water* into the external *Jugular* of the ſame Bitch. She was ſeized with Convulſions as violent as the former, before we could untie her. They laſted about five Minutes; after which ſhe recovered gradually, and continued well.

IX. *November* 20, We injected four Ounces of the *Water* by the *Anus*, without any Dilution, into a ſtrong Dog of a middling Size. He was ſeized with Convulſions and Difficulty of Breathing, in leſs than two Minutes after the Injection. He fell to the Ground as ſoon as his Convulſions began, and never once attempted to riſe; nor were his Convulſions in any Sort ſo violent, neither did they continue ſo long as in the former

mer Inſtances. He bled at the Noſe about four Spoonfuls. The Blood was of a very bright florid Colour, His Convulſions laſted about four Minutes; after which he became entirely paralytick, and died in three Minutes more.

We found the *Stomach*, *Inteſtines*, *Liver*, *&c.* in the ſame State as thoſe above-mentioned. Upon cutting about an Inch from the lower Part of one of the Lobes of the *Lungs*, the Blood flowed from it in great Plenty, and appeared more florid and fluid than uſual.

X. *Decemb.* 14, We gave five Ounces of *Laurel-Water* by Clyſter to a Dog ſomewhat of the Size and Shape of the *Italian* Greyhound. He ſeemed at firſt to be no Way affected with it, but in about five Minutes he began to droop, and loſe the Uſe of his Limbs. He did not once yell, or ſtruggle as the others had done, but ſunk gradually, till he became at laſt entirely paralytick. He had not any Convulſion, except a kind of *Spaſmus Cynicus*, a few Minutes before he died, which happened in half an Hour after the Injection of the Clyſter.

Upon opening the *Abdomen*, we found the Veins much diſtended with Blood, as were alſo the Veins and Sinuſes of the *Brain*.

XI. *December* 19, We gave three Ounces of the *Water* in the ſame Manner to a Cur of the Lap-dog Size. He died in ſeven Minutes, without any Convulſion, except a *Tetanus* in the Muſcles that extend the *Head*.

The *Lauro Ceraſus* being an Ever-green, and abounding with a warm eſſential Oil, we imagined that other

Ever-

Ever-greens might partake of the ſame poiſonous Quality.

Accordingly we made Trial of a *Water* diſtilled in an *Alembick* from the Leaves of the *Yew-Tree*, ſo much talked of by the Ancients, and whoſe very Shade they ſuppoſed to be fatal to thoſe who ſate or ſlept under it.

XII. We gave three Ounces of this *Water* by Clyſter to a very ſmall Cur Dog, but he was not in the leaſt affected with it.

XIII. We alſo gave, by the Mouth, two Ounces of a *Water*, diſtilled from the Leaves of the *Bay-Tree*, to a young Spaniel, without any Effect.

XIV. We afterwards made an Experiment with the diſtilled *Water* of *Box-Leaves*, which had a very ſtrong *Narcotick* Smell. We injected five Ounces of this *Water*, by the *Anus*, into a ſmall Cur Dog, but he was no Way affected with it, though we kept him twelve Hours after the Operation.

XV. Being deſirous to know whether the Virulency of *Laurel-Water* was owing to the Fire in Diſtillation, we poured warm Water upon ſome *Laurel*-Leaves bruiſed, and made a ſtrong Infuſion of them. We poured an Ounce of it down a Dog's Throat, half of which was ſuppoſed to enter the Stomach, and five Minutes after another Ounce was given in like Manner. The Dog ſeemed to be ſomewhat ſick at his Stomach, but was ſoon as lively as ever. A few Minutes after this another Ounce was given to him by the Mouth, of which we ſuppoſe a fourth Part to have been loſt. He ſoon after ſtared, and trembled very much. In five Minutes another Ounce was exhibited, upon which

he

he trembled as before, but in a ſittle Time he appeared eaſy and lively.

Imagining that theſe ſmall Quantities loſt their Power, during the Intervals of giving them, in ten Minutes after his taking the former Doſe, we poured down his Throat two Ounces and a half at once. He immediately tumbled on his Back convulſed, and tumbled over three or four times, but quickly returned to his Feet. He ſtaggered, his Eyes ſtared, and he ſate down like a Dog that is tired. At length he ſhut his Eyes, his Neck became extended, and we apprehended he was falling into Convulſions; but inſtead thereof he vomited a vaſt Quantity of indigeſted *Chyle*, in which appeared a great Portion of the Infuſion; after which he ſeemed to be perfectly recovered.

XVI. In about twenty-five Minutes after this we gave the ſame Dog by the Mouth two Ounces of the Juice expreſſed from *Laurel*-Leaves, and in about ten Minutes more another Ounce was given him in the ſame Manner. In a few Minutes he began to loſe the Uſe of his hinder Legs, but he quickly recovered them. Upon his taking another Ounce ſoon after the former, he fell into a great Difficulty of Breathing, and yelled much. After this he was ſeized with very ſtrong Convulſions, which affected his lower Jaw and hinder Legs moſt remarkably.

In about the Space of five Minutes theſe Convulſions were ſucceeded by an entire Reſolution of all the Limbs. He breathed with great Difficulty, and very ſlowly. No Appearance of Expiration. Sometimes we obſerved two Attempts at Inſpiration without Intermiſſion, or cloſing of the Mouth. At other

times

times there was near the Space of a Minute between two Inſpirations.

After this he was ſeized with a Trembling in his Limbs, and in about three Quarters of an Hour from his taking the laſt Ounce, he died without any Struggling, with his Tail extended.

There were ſeveral other Experiments made of the ſame Kind, by ſome Gentlemen of the Profeſſion here, which correſponded exactly with the foregoing, excepting this one Circumſtance, that they were of Opinion, that this Poiſon occaſioned an Inflammation in the *Stomach* and *Guts*.

Towards clearing this Diſpute, We, who thought otherwiſe, put together the following Hints, from which it appears that the Fact is not as they imagined, and that notwithſtanding we find, upon an Animal's being killed by this Poiſon, the Veins greatly diſtended with Blood, yet there is not any Inflammation produced by it.

I do not know any thing that will illuſtrate this Matter better, than the Analogy which may be obſerved between the Convulſions occaſioned by the Epilepſy, and thoſe which are the Effect of *Laurel-Water*.

For Inſtance, in the Epilepſy, the Body is uniververſally convulſed, eſpecially the Muſcles of the *Neck*, the *Tongue*, the lower *Jaw*, and thoſe of the *Arms*.

The Effect of theſe Convulſions is this: The *Heart* beats with unuſual Violence and Frequency, the neceſſary Conſequence of which is, that the Blood will be thrown in greater Plenty from the Arteries into the Veins. But becauſe the Muſcles do compreſs the Veins

more than the Arteries (whoſe Syſtole does enable them to overcome that Preſſure) therefore the Blood, which is ſtill puſhed forward by the Syſtole of the Heart into the Veins, will be retained there by the aforeſaid Preſſure of the Muſcles, and will return in a very ſmall Quantity to the *Heart*.

For Example, the *Abdominal* Muſcles being convulſed, preſs the *Stomach* and *Inteſtines* upon the *Vena Cava aſcendens*, and likewiſe upon the *Vena Portæ*; by which Means the Blood, returning from the lower Extremities, is retained in thoſe Veſſels. Accordingly we ſee the viſible and immediate Effects of this Preſſure are the forcing out the Excrements of the *Bladder* and *Inteſtines*, and very frequently the *Profluvium Seminis*.

In like Manner the Preſſure of the Muſcles of the *Neck*, *Tongue*, and lower *Jaw* upon the *Jugular* Veins and their Branches, will not ſuffer the Blood to return to the *Heart* by the *Vena Cava deſcendens*.

To this we may add the Preſſure of the *Diaphragm* and *Ribs* upon the *Lungs*, by which Means the Trunks of the *Vena Cava aſcendens* and *deſcendens* are compreſſed at their Inſertion into the *Heart*.

Hence follows that frightful Blackneſs of the Face during the Paroxyſm, and the prodigious Swelling of the Veins of the Head, eſpecially the Temporal.

The neceſſary Conſequence of all this muſt be, that if the Convulſion laſts long enough the Man muſt die, on Account of the Blood being thrown out of the Arteries into the Veins, and not returning to the Heart. And I make no Queſtion, that if ſuch a Perſon was opened after Death, we ſhould find the *Vena Cava*, the *Vena Portæ*,

Portæ, the Veins and Sinuſes of the *Brain*, together with all their ſmalleſt Ramifications, very much diſtended with Blood, and the Arteries on the contrary almoſt empty.

But if the Epileptick Convulſion ceaſes before the Circulation of the Blood is entirely ſtopped, then all becomes calm again, the Preſſure is taken off the Veins, the Blood returns to its uſual Courſe, and in a few Hours the ſick Perſon is perfectly recovered.

And yet all this violent Convulſion of the Body, this prodigious Diſtenſion of the Veins, and Interception of the Courſe of the Blood paſſes without any Inflammation, as appears from the ſpeedy Recovery of the ſick Perſon: For if the Convulſion had occaſioned an Inflammation, a Fever muſt neceſſarily have enſued, which would diſcover itſelf by manifeſt Tokens, and would require a much longer Time for its Abatement.

Let us now obſerve the Analogy between theſe Appearances, and thoſe produced by *Laurel-Water*.

We find by Experiment, that an Ounce, or even two Drachms and a half of *Laurel-Water* will occaſion more violent Convulſions than three Ounces, or even five of it. *Exp.* 4, 5 to 11. If therefore an Inflammation was the neceſſary Conſequence of this *Water* being taken into the *Stomach* or *Guts*, the more violent the Convulſion is, the greater the Inflammation ought to be.

On the contrary we find, that the more violent the Convulſion is, the greater is the Probability that the Creature will recover. *Exp.* 4 to 7. And when it ſo falls out, the Manner is exactly the ſame as in the Recovery of an Epileptick Perſon. In a few Minutes the Creature becomes as brisk as if no ſuch Thing had happened.

Now if an Inflammation was at all the neceſſary Conſequence of this Poiſon, though the Creature recovers, yet there muſt be ſome Inflammation, greater or leſs, produced, which muſt occaſion more violent and laſting Symptoms. But ſince none ſuch appear, ſince the Recovery is ſo ſudden and effectual, it is the ſtrongeſt and plaineſt Argument, that there is not any Inflammation produced.

If the *Laurel-Water* is adminiſtred to the Quantity of an Ounce or more, the Creature unavoidably dies in a few Minutes, and upon opening him the Appearances are theſe. Both the Trunks of the *Vena Cava*, and all the Ramifications of the *Meſeraick* Veins are greatly diſtended with Blood. Theſe Veſſels are eaſily diſtinguiſhed from the Arteries, not only by the Thinneſs of their Coats, but alſo by the Colour which the Blood exhibits to the Eye. Now I conceive that all Inflammations have their Beginning in the Arteries, and that they are produced, becauſe there is no free Paſſage for the Blood into the Veins. But if once this Paſſage becomes free (as in this Caſe it ſurely is, for we find all the Veins diſtended with Blood beyond their natural Dimenſions) the Inflammation is then at an End, the Cauſe which produced it being taken off.

Moreover, the Fact laid down, that the Veins are preternaturally diſtended with Blood, does neceſſarily conclude, that the Arteries are not diſtended with it, and conſequently that there cannot be any Inflammation; for if the Quantity of Blood is encreaſed in the Veins, it muſt be proportionably diminiſhed in the Arteries.

To what has been ſaid, we may add the following Obſervation; *viz.* that if there was any Inflammation produced by this Poiſon, it ought to appear moſt remarkable

markable on the Inſide of the *Stomach* and *Inteſtines*, becauſe of the immediate Contact it has with thoſe Parts.

All other Poiſons which occaſion Inflammations in the *Stomach* and *Guts*, do firſt operate upon the Blood-Veſſels, and corrode the Parts inflamed. They occaſion Vomitings and Fluxes of Blood, which at length terminate in Convulſions.

One may very eaſily be deceived upon opening the *Stomach* of a Dog, and may miſtake the Redneſs of the *Tunica Villoſa* for an Inflammation.

The inner Coat of a Dog's Stomach is naturally of a ruddy Fleſh-colour, and therefore of all domeſtick Animals a Dog has the quickeſt and ſtrongeſt Digeſtion. Accordingly we ſee, that they ſwallow Bones, and digeſt them perfectly well; and although they are but half chewed when taken into the Stomach, yet they are at laſt reduced to as ſoft a Conſiſtence as any other Part of their Aliment. It is for this Reaſon therefore, that the Stomachs of Dogs are more plentifully ſupplied with Blood than thoſe of other Animals; by which Means not only the muſcular Force of the Stomach, but its Warmth alſo, which is the principal Inſtrument of Digeſtion, is very much increaſed.

N. B. The 15th and 16th *Experiments* were communicated to me by Dr. *Stephens*, a Fellow of our College of Phyſicians. I am,

SIR,

Your moſt Humble Servant,

T. MADDEN.

Dublin, April 29, 1731.

DR. John Rutty *of* Dublin, *informed the Publiſher, That whereas there were ſeveral other Experiments made at the ſame Time by other Gentlemen, as Dr.* Madden *mentions, which agreed with theſe, ſome Perſons who were preſent at them propoſed ſeveral things to be tried as Antidotes to this Poiſon; accordingly* Bole, Vinegar *and* Milk *were given to a Dog which had ſwallowed ſome of the* Laurel-Water: *The* Bole *and* Vinegar *were not obſerved to do much good, but the Dog which drank the* Milk *recovered without any bad Symptoms; but at that Diſtance of Time the Doctor could not recollect the Proportions that were given: He thinks a Pint of* Milk. *The Publiſher hath tried ſeveral Experiments in* Eſſex *and in* London, *which correſpond with, and confirm the above-related, and will be communicated to the Publick in ſome other* Tranſaction.

FINIS.

ERRATA.

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Numb. 419.

PHILOSOPHICAL TRANSACTIONS

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V. *An*

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Jos: Banks

I. *An*

I. *An Account of Mr.* James Chriſtopher Le Blon's *Principles of* Printing, *in Imitation of* Painting, *and of* Weaving Tapeſtry, *in the ſame manner as* Brocades. *By* Cromwell Mortimer, *M. D. S. R. Secret.*

MR. *Le Blon* endeavouring to fix the true Harmony of Colouring in Painting, found that all viſible Objects may be repreſented by the three primitive Colours, *Red*, *Yellow*, and *Blue*; for out of them, all others, even Black itſelf, may be compounded. We are beholden to the great Sir *Iſaac Newton* for the Diſcovery of the *Difference of Colours contained in the Rays of the Sun*; *and that the Union of them all produces a White, which is Light itſelf.*

For Diſtinction ſake Mr. *Le Blon* calls thoſe Colours which are comprehended in the Rays of the Sun, *Impalpable Colours*, and thoſe uſed in Painting, *Material Colours.* In the material Colours, a Mixture of *all Three* produces a *Black* or Darkneſs, contrary to what is obſerved in the *Impalpable*, which I ſaid juſt now produce *White.* Mr. *Le Blon* takes this Phænomenon to be owing to the Body or Subſtance of which theſe *three material Colours* conſiſt, and to the Particles of them being *Opake*, and not *Tranſparent*; for they only reflect certain Rays of Light, that ſtrike on their Surfaces; and therefore when ſmall Particles of different Colours are placed cloſe together, if they are ſo ſmall that each of them cannot be ſeen ſeparately by the Eye, we do not diſcern the

Colour of each particular Atom, but only the blended reflected Rays, proceeding from the adjoining Particles: Thus Yellow and Red produce an Orange, Yellow and Blue a Green, *&c.* which ſeems to be confirmed by placing two Pieces of Silk near together; *viz.* Yellow and Blue: When by intermixing of their reflected Rays, the Yellow will appear of a light Green, and the Blue of a dark Green; which deſerves the farther Conſideration of the Curious.

He hath reduced the *Harmony of Colouring in Painting to certain infallible Rules, built on this Foundation:* Whereas, according to the common Practice of Painters, their Colouring is the Effect of meer Chance or Gueſs-work at firſt, but improved by Experience; all Painters uſually declaring that there can be no certain Rules given for mixing Colours. Mr. *Le Blon* publiſhed, ſome Years ago, an ingenious Book on this Subject, intituled, *Coloritto*; or, *the Harmony of Colouring in Painting.*

By theſe Rules he light on the Manner of Printing any Object in its *natural* Colours, by the Means of *three* Plates, and the *three* primitive Colours; an Art attempted and ſought after ever ſince the Invention of Printing, but in vain, and thought impoſſible, till he put it in practice about fifteen Years ago.

The Plates are engraved chiefly after the *Mezzo Tinto* Manner; only the *darker Shades*, and ſometimes the *Out-Lines*, where they are to appear very ſharp, are done with a common Graver. Each Plate is not compleatly engraved, but only contrived to take ſuch a *Portion of the Colour* as is neceſſary with the *other two Plates*, to make the Picture compleat.

This *Art of Printing* conſiſts in ſix Articles; *viz.*

I. To produce any Object with three Colours, and three Plates.
II. To make the *Drawings* on each of the three Plates, ſo that they may exactly tally.
III. To engrave the three Plates, ſo as that they cannot fail to agree.
IV. To engrave the three Plates in an uncommon Way, ſo as that they may produce 3000 and more good Prints.
V. To find the three true *primitive material Colours*, and to prepare them, ſo as that they may be imprimable, durable, and beautiful.
VI. To print the three Plates, ſo as that they may agree perfectly in the Impreſſion.

The *firſt* of which is the moſt conſiderable, comprehending the *Theoretical* Part of the Invention; and the other *five* are ſubſervient to bring it into *mechanical* Practice, and of ſuch Importance, that if any one of them be wanting, nothing can be executed with Succeſs or Exactneſs. Sometimes more than the *three Plates* may be employ'd; *viz.* when Beauty, Cheapneſs, and Expedition require it.

The Obſervation of the *compounded Colours* reflected from two Pieces of Silk, of different Colours, placed near together, firſt gave him the Thought of what the Effect of weaving *Threads* of different Colours would be, when all the *Threads* were ſo fine, as not to be diſtinguiſhed at a ſmall Diſtance one from another.

By the ſame Principles of producing any viſible Object with a ſmall Number of Colours, he arrived at the Skill of producing in the *Loom* all that the *Art of Painting* requires. An Art likewiſe often attempted, but as often abandoned, and declared impoſſible till now, as well as the other of Printing in Colours. And 'tis probable, many Improvements may from hence be made in ſeveral Trades, eſpecially in combing of Wool, where the Mixing of ſeveral Colours may be of great Uſe; but he hath not yet had Time to apply it to any thing elſe beſides Painting, Printing, and Weaving.

The Colours uſed in *Weaving* being only *ſuperficial*, and ſo differing from both the *impalpable* and the *material* Colours, and not being to be ſo cloſely joined or incorporated together as thoſe, will not of themſelves produce a *White* or *Black*, but only a *Light Cinnamon*: Wherefore, in *Weaving* he hath been obliged to make uſe of *white* and *black* Threads, beſides *red*, *yellow*, and *blue*; and tho' he found he was able to imitate any Picture with *theſe five* Colours, yet for Cheapneſs and Expedition, and to add a Brightneſs where it was required, he found it more convenient to make uſe of ſeveral intermediate Degrees of Colours.

There are two Ways in Uſe at *Bruſſels*, and at the *Goblins* in *Paris*, for making *Tapeſtry* after the common Manner: One they call the *flat Way*, and the other the *upright*. In the *flat Way* they have the *Warp* ſtretched in a *Frame* length-wiſe of the Piece: It is made of white Worſted, and the *Pattern* lies cloſe under it; ſo that the Workman can ſee the Figures through the Warp: He is provided with *Bob-*

bins

bins of various Colours of Silk or Worſted, as the Piece requires: Then he takes up with his Fingers one Thread after another, as they anſwer to any Colour in the Painting beneath; and with the other Hand paſſes the *Bobbin* with the ſame Colour, and ſtrikes the Threads cloſe with an *Ivory Comb*. Some of theſe *Frames* are made like a *Loom*, with a *Warp* paſſed through the *Leiſhes* and *Tredles* for the Feet, with which they open the Threads of the Warp, to paſs a common Shuttle through them, when it is neceſſary to make a long Throw, as is required in *Grounds*, *Pillars*, and *tall Uprights*.

In the *upright Way* the *Warp* runs from Top to Bottom of the Piece; the *Pattern* is placed upright, and cloſe behind it, and the Out-lines are drawn in Charcoal upon the *Foreſide* of the Warp. The Workman is placed with his Back to the Light, by which means he can ſee the *Pattern* better; then he takes up the Threads one by one, and paſſes the Bobbin, as in the other Way, and ſtrikes it cloſe with the Comb: All which is near as *tedious* as *Needlework* itſelf; which is the Reaſon why *fine Tapeſtry* comes to ſuch high Prices, ſo that none but *Princes* care to buy it; and what can be had at a moderate Price is always *coarſe*, and of a low Taſte: For Workmen who have any good Notion of *Painting*, and are capable of adjuſting the Colours, are not to be had, but for exceſſive Wages; which much enhances the Price likewiſe: But in Mr. *Le Blon*'s new Way of *weaving Tapeſtry in the Loom with a Draw-boy*, Tapeſtry may be performed almoſt as expeditious as fine Brocades: For when the *Loom* is once ſet and mounted, any common

mon *Draft-Weaver*, tho' not acquainted with *Drawing* nor *Painting*; nay, hardly knowing what Figure he is about, exactly produceth what the *Painter* hath repreſented in the original *Pattern*: And thus a *Piece* of *Tapeſtry* may be woven in a Month or two, which, in the common Way of *working*, would take up ſeveral Years: And what in the common Way coſts a thouſand Pounds, may, by this means, be afforded finer and better for a hundred Pounds. Therefore, it is likely, this *woven Tapeſtry* may become a currant Merchandize; and that many thouſand induſtrious Families may be well employed about it.

The main *Secret* of this Art conſiſts in *drawing the Patterns*, from which any common *Draft-Weaver* can mount the Loom; and when that is done, the Piece may be made of any Size, by only widening the *Reeds* and the *Warp*; and a *Reverſe* may be made with the ſame Eaſe; which is done by the Boy's pulling the *Laſhes* up again in the ſame Order in which he pull'd them down before; by which Contrivance the Tapeſtry may be ſuited to any Room, whether the Light comes in on the right Hand, or on the left.

The *Patterns* are painted upon Paper, whereon are printed Squares from Copper Plates, and theſe ſubdivided by as many Lines as anſwer to the Threads of the Warp, which run length-wiſe of the Piece; then they try how many Threads of the Shoot anſwer in Breadth to every Subdiviſion of the Squares. Every Thread of the Warp goes through a ſmall Braſs Ring called a *Male*, or through a Loop in the Leiſh, and hath a ſmall long Weight or *Lingoe* hung below, to counter-

counter-balance the Packthreads, which going from the Top of the Rings or Loops, are paſſed over the Pullies in the *Table* directly over the Loom, and are continued nearly in a *Horizontal* Poſition on one ſide of the Loom, to a convenient Diſtance; where they are all ſpread on a Croſs-piece faſtened to two Staples: Theſe are called the *Tail of the Mounture*; and from each of theſe Packthreads, juſt by the ſide of the Loom, are faſtned other Packthreads called *Simples*, which deſcend to the Ground; ſo that by pulling theſe *ſimple Chords*, you raiſe any of the Threads of the Warp at pleaſure; wherefore they faſten a Loop or *Potlart* to as many of theſe *ſimple Chords* as there are Threads of the Warp to be pull'd up at every Shoot, or every Throw of the Shuttle; by which means the Shoot ſhews itſelf on the right Side, where the Warp is pulled up: And in ordering this, they are guided by the *Pattern*, on which they count the Diſtances of the Subdiviſions, which contain the ſame Colours in the ſame Line, and can be ſhot at once: Then they faſten *Potlarts* to the ſeveral *ſimple Chords*, that draw up the Rings, through which thoſe Threads of the Warp run, which are to lie behind this Colour; they tie all theſe Loops together, and faſten a Piece of Worſted or Silk to the Knot, of the ſame Colour that the Workman is to throw; and the Boy, when he pulls each Loop, names the Colour, that the Weaver may take the proper Shuttle, and ſo on for every Colour to be thrown.

II. *A Letter to Dr.* Jurin, *F. R. S. giving an Account of the Condition of the Town of* Haſtings, *after it had been viſited by the* Small Pox.

SIR, *Rye*, Jan. 28. 173⅞.

THE following is a true Account of the preſent Condition of the Town of *Haſtings*; after its having been viſited with the *Small Pox*; which continued there about a Year and half. I ſhould here inſert an Account of thoſe inoculated, if any thing remarkable had happened: I can only ſay this, that they all had the Diſtemper very favourably, and continue perfectly well. I am,

SIR,

Your very much obliged, humble Servant,

T. FREWEN.

The Number of thoſe that recovered of the *Small Pox* (including four that were inoculated)	608
Died of it	97
Eſcaped it	206
Died of other Illneſſes ſince the *Small Pox* raged there	50
The whole Number of Inhabitants in that Town are	1636
Males	782
Females	854

N. B. *There is at preſent no* Small Pox *in that Town.*

III. *A*

III. *A Catalogue of* Eclipſes *of the four* Satellites of Jupiter, *for the Year* 1732. *By* James Hodgſon, *F. R. S. and Maſter of the Royal Mathematical School at* Chriſt's Hoſpital, London.

I HAVE been long importuned by ſeveral of my Friends to publiſh a Catalogue of *Eclipſes* of *Jupiter*'s *Satellites*, to the Intent that ſuch Perſons as are furniſhed with proper Inſtruments, and want neither Leiſure nor Inclination to obſerve them, may no longer neglect the frequent Opportunities that offer, for want of timely Notice.

The great Number of *Eclipſes* that happen in a Year, as appears by the following Catalogue, amounting to 352; notwithſtanding the fourth *Satellite* will paſs wide of the Shadow, after the middle of *January* next; the Eaſe with which they are obſerved, eſpecially ſince the great Improvement made to the reflecting Teleſcope by Mr. *Hadley*; the little Skill that is required to make the Obſervations, ſince the Difference of Times, when obſerved by the largeſt Glaſſes, and the ſmalleſt through which they may be ſeen, amounts to ſcarce one quarter of a Minute; render theſe Obſervations the moſt proper of any that the Heavens afford us, at preſent, for determining the Longitude of Places; and I may venture to aſſert, that there are very few Places of Note upon the Surface of our habitable Globe, whoſe Longitudes are already known, that have not either been abſolutely deter-

mined or, at leaſt, have been rectified and confirmed by them.

How near theſe Calculations will anſwer to the Heavens, muſt be left to Time to diſcover; but as the Tables that I have made uſe of had received no Correction for fifty Years paſt, I have endeavoured, during the ſmall Time ſince I ſet myſelf about this Work, to correct them as much as the Time would allow me; and, I hope, before the Year comes about, to bring ſome of the *Satellites* to anſwer nearer than they do at preſent, and in the mean time, if thoſe Gentlemen who ſhall have an Opportunity of obſerving them, will tranſmit their Obſervations to the Royal Society, it will contribute towards a farther Rectification of the Tables.

I have by me the Times of the Appulſes of the Moon to the fixed Stars, and their Occultations, by the Interpoſition of her Body, for the ſucceeding Year; which I had ſome Thoughts of communicating: But as the long-expected Lunar Tables of Dr. *Halley* will very ſoon be publiſhed (as I am informed) I have deferred that Affair for another Year.

For the Benefit of thoſe Perſons who have not been accuſtomed to make Obſervations of this Kind, I had determined with myſelf to have given the Configurations of the *Satellites*, at the Times when thoſe that are viſible in our Hemiſphere, which are marked with a Star, will happen; but as it would have taken me up much Time in doing, as well as Expence in graving, I have choſe rather to give ſuch People ſome Inſtructions, which, if well obſerved, will not only point out the exact Spot in the Heavens, where the

Appear-

Appearance will be viſible (for want of knowing which, the *Satellite* may be Immerged ſome time before it is miſſed, and Emerged before it is diſcovered) but will prevent them from taking one *Satellite* for another.

And firſt, the Obſerver muſt take Notice, that from the Time of the Conjunction of *Jupiter* with the Sun, which happened the beginning of *September* laſt to the Time of the Oppoſition which will happen in the middle of *March* next, the *Eclipſes* in general will be viſible on the Weſtern Side, or on the Right Hand of *Jupiter*, when viewed in the Heavens, and at the Time of the firſt Quadrature, which will happen about the middle of next *December*, the firſt *Satellite* will immerge into the Shadow of *Jupiter*'s Body at the Diſtance of two Semidiameters of *Jupiter*, nearly from the Center of his Body: The ſecond *Satellite* will immerge at the Diſtance of two Semidiameters and an half, the third *Satellite* at the Diſtance of three Semidiameters and a quarter. And as the Earth haſtens to the Oppoſition, which will happen in the middle of next *March*, the Diſtance of each *Satellite*, at the Time of the *Eclipſe* from the Body of *Jupiter*, will grow leſs and leſs, till when the Earth arrives at the Oppoſition, the *Satellite* will immerge cloſe to the Limb of *Jupiter*; and this Diminution or Decreaſe of Diſtance will be ſo regular, that the Spectator, by allowing for the proportionable Part of Time between the Quadrature and the Oppoſition or Conjunction (the Diſtances of the *Satellites* from the Body of *Jupiter* at equal Diſtances from theſe Points being the ſame) I ſay, by theſe

Means the Spectator will be at no Loſs to find the exact Point where the *Satellite* will appear or diſappear. And on the contrary, during the Space of Time that the Earth is moving from the Oppoſition through the ſecond Quadrature to the Conjunction, which is from the Middle of *March* to the Beginning of *October*, the *Eclipſes* will be ſeen on the Eaſt Side, or on the Left Hand of *Jupiter*, viewed from the Earth, and at the ſame Diſtances, as in the former Caſe, according as ſhe approaches to the Quadrature from the Oppoſition, or recedes from it in going to the Conjunction.

By reaſon of the great Diſtance of the third *Satellite* from *Jupiter*, for about ſix Weeks before and after the Quadratures, the Immerſions and Emerſions become viſible on the ſame Side of the Body of *Jupiter*; and this, without any other Proof, is an ocular Demonſtration, that neither *Jupiter* nor any of his *Satellites* have any Light of their own, and none but what they borrow from the Sun. And the ſame happens to the fourth *Satellite*, of which we have but two *Eclipſes* in the whole Year; which, according to this Calculation, will happen on the 15th of *January* next, when, if the Air be clear, it will be ſeen to enter into the Shadow about Twelve at Night, on the Right Hand of *Jupiter*, at the Diſtance of four Semidiameters and a quarter from his Center, and will emerge on the ſame Side thirty Minutes after One in the Morning, at the Diſtance of almoſt four Semidiameters on the ſame Side.

After this manner will the *Satellites* appear, if they could be ſeen with the naked Eye; but if they are ſeen thro' a Teleſcope compoſed of two Convex Glaſſes,

they

they will be inverted, that is, from the Time of the Conjunction to the Time of the Oppoſition, they will appear on the Left Hand of *Jupiter*; and from the Oppoſition back again to the Conjunction, they will be viſible on the Left Hand of his Body.

If theſe Predictions ſhould prove inſtrumental in exciting the Curious to improve this moſt uſeful Branch of the Aſtronomical Science, it will be a ſufficient Recompence for the Pains I have taken.

ECLIPSES

ECLIPSES *of the first* Satellite *of* Jupiter *for the Year* 1732.

January. Immersions.				*February.* Immersions.				*March.* Immersions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	M.	H.	S.
01	18	42	21*	02	15	07	16*	01	22	46	15
03	13	10	16*	04	09	35	37*	03	17	15	19*
05	07	37	59	06	04	04	04	05	11	44	25*
07	02	5	37	07	22	32	38	07	06	13	30*
08	20	33	27	09	17	01	10*	09	00	42	35
10	15	01	18*	11	11	29	42	10	19	11	42
12	09	29	11*	13	05	58	10	12	13	40	47*
14	03	57	06	15	00	26	52	Emerfions			
15	22	25	05	16	18	55	32*	14	10	21	41
16	16	53	06*	18	13	24	16*	16	04	50	48
19	11	21	09*	20	07	53	02	17	23	19	53
21	05	49	15	22	02	21	50	19	17	49	01*
23	00	17	22	23	20	50	39	21	12	18	09*
24	18	45	32*	25	15	19	29*	23	06	47	17*
26	13	13	46*	27	09	48	23*	25	01	16	27
28	07	42	13	29	04	17	18	26	19	45	34
30	02	10	27					28	14	14	39
31	20	38	52					30	08	43	42

ECLIPSES *of the first* Satellite.

April. Emerſions.				*May.* Emerſions.				*June.* Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	H.	M.	S.
01	03	12	45	01	05	23	36	02	01	55	31
02	21	41	47	02	23	52	14	03	20	23	44
04	16	10	49*	04	18	20	48	05	14	51	56
06	10	39	51*	06	12	49	21*	07	09	20	13
08	05	08	48	08	07	17	53	09	03	48	29
09	23	37	44	10	01	46	27	10	22	16	47
11	18	06	39	11	20	14	59	12	16	45	04
13	12	35	33*	13	14	43	30*	14	11	13	22*
15	07	04	27	15	09	12	01*	16	05	41	42
17	01	33	19	17	03	38	31	18	00	10	01
18	20	02	09	18	22	09	00	19	18	38	21
20	14	31	00*	20	16	37	28	21	13	06	43
22	08	59	52*	22	11	05	55*	23	07	35	08
24	03	28	42	24	05	34	10	25	02	03	34
25	21	57	31	26	00	01	27	26	20	32	01
27	16	26	15	27	18	30	50	28	15	00	29
29	10	54	57	29	12	59	02*	30	09	28	58*
				31	07	27	21				

ECLIPSES *of the first* Satellite.

July. Emerſions.				*Auguſt.* Emerſions.				*September.* Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	H.	M.	S.
02	03	57	27	01	06	05	53	02	02	49	29
03	22	25	58	03	00	34	47	03	21	18	42
05	16	54	29	04	19	03	43	05	15	47	54
07	11	23	01	06	13	32	41	07	10	17	05
09	05	51	32	08	08	01	40*	09	04	46	14
11	00	20	06	10	02	30	40				
12	18	48	46	11	20	59	40				
14	13	17	28	13	15	18	24				
16	07	46	13	15	09	57	46				
18	02	15	00	17	04	26	52				
19	20	43	45	18	22	56	00				
21	15	12	31	20	17	25	18				
23	09	41	19	22	11	54	21				
25	04	10	15	24	06	23	33				
26	22	39	10	26	00	52	43				
28	17	08	06	27	19	21	53				
30	11	36	59	29	13	51	06				
				31	08	20	17				

Jupiter and the Sun in Conjunction.

ECLIPSES

ECLIPSES *of the first* Satellite.

October. Immersions.				*November.* Immersions.				*December.* Immersions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	H.	M.	S.
				01	04	59	34	01	06	52	14
				02	23	27	42	03	01	19	45
				04	17	55	47*	04	19	47	17*
				06	12	23	47	06	14	14	48*
				08	06	51	48	08	08	42	18
				10	01	19	49	10	03	09	48
				11	19	47	49*	11	21	37	19
				13	14	15	43	13	16	04	45*
				15	08	43	32	15	10	32	51
Immersions.				17	03	11	17	17	04	59	41
21	14	09	52	18	21	39	00	18	23	27	10
23	08	38	17	20	16	06	38	20	17	54	38*
25	03	06	37	22	10	34	15	22	12	22	09
26	21	34	51	24	05	01	51	24	06	49	42
28	16	03	07*	25	23	29	27	26	01	17	18
30	10	31	21	27	17	57	03*	27	19	44	56
				29	12	24	40	29	14	12	35*
								31	08	40	12

ECLIPSES *of the ſecond* Satellite *for the Year* 1732.

January. Immerſions.					*February.* Immerſions.					*March.* Immerſions.				
D.	H.	M.	S.		D.	H.	M.	S.		D.	H.	M.	S.	
*1	10	21	28	A. M.	01	13	07	15*		04	12	49	34	*
04	02	54	18		05	02	24	44		08	02	08	13	
07	16	10	16*		08	15	42	23		11	15	26	52	*
11	05	26	25		12	05	00	04		Emerſions.				
14	18	42	45*		15	18	17	55*		15	07	31	59	*
18	07	59	17		19	07	35	58		18	20	50	32	
21	21	16	01		22	20	54	11		22	10	09	08	*
25	10	32	52		26	10	12	29*		25	23	27	48	
28	23	49	59		29	23	30	57		29	12	46	18	

April. Emerſions.				*May.* Emerſions.				*June.* Emerſions.			
D.	H.	M.	S.	D.	M.	H.	S.	D.	H.	M.	S.
02	02	04	46	04	01	08	40	01	12	07	59*
05	15	23	21*	07	15	06	20	05	01	24	52
09	04	41	47	11	04	23	59	08	14	41	53
12	18	00	09	14	17	41	36	12	03	58	57
16	07	18	26*	18	06	59	07	15	17	16	04
19	20	36	42	21	20	16	34	19	06	33	13
23	09	54	55*	25	09	33	45*	22	19	50	26
26	23	13	02	28	22	50	53	26	09	07	49*
30	12	30	54					29	22	25	15

ECLIPSES *of the second* Satellite.

July. Emerſions.				*Auguſt.* Emerſions.				*September.* Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	H.	M.	S.
03	10	42	40	04	11	24	13	01	21	53	54
07	01	00	09	08	00	42	39	05	11	12	50
10	14	17	41	11	14	01	09	09	00	31	38
14	03	35	27	15	03	19	45				
17	16	53	24	18	16	38	27				
21	06	11	22	22	05	57	17				
24	19	29	30	25	19	16	10				
28	08	47	47*	29	08	35	02*				
31	22	06	01								

October. Immerſions.				*November.* Immerſions.				*December.* Immerſions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	H.	M.	S.
				01	05	20	50	03	04	45	40
				04	18	37	35*	06	18	01	09*
				08	07	54	06	10	07	16	39
				11	21	10	39	13	20	32	05
				15	10	26	53	17	09	47	29
Immerſions.				18	23	42	48	20	23	02	53
21	13	29	31	22	12	58	38	24	12	18	28
25	02	46	48	26	02	14	21	28	01	34	11
28	16	03	49	29	15	30	04*	31	14	49	57

ECLIPSES *of the third* Satellite *for the Year* 1732.

January.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
07	02	34	47	07	05	33	07
14	06	30	30	14	09	28	02
21	10	26	59*	21	13	23	45
28	14	24	12*	28	17	20	10

February.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
04	18	22	09	04	21	17	21
11	22	20	46				
19	02	19	57				
26	06	19	47				

March.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M	S.
04	10	20	10*				
11	14	20	50*	28	21	12	05
				26	01	12	06

April.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
				02	05	11	49
				09	09	11	34*
				16	13	10	56*
23	14	23	30	23	17	10	10
30	18	22	58	30	21	08	52

ECLIPSES

ECLIPSES *of the third* Satellite.

May.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
07	22	21	51	08	01	07	01
15	02	20	34	15	05	04	58
22	06	19	01	22	09	02	39*
29	10	16	46	29	12	59	38

June.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
05	14	14	12	05	16	56	18
12	18	11	47	12	20	53	07
19	22	09	31	20	00	50	05
27	02	07	39	27	08	45	02*

July.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
04	06	06	02	04	08	45	02 *
11	10	04	34*	11	12	42	48
18	14	03	47	18	16	41	17
25	18	03	27	18	20	40	11

Auguſt.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
01	22	03	23	02	00	39	23
				09	04	38	57
				16	08	38	52*
				23	12	39	13
				30	16	39	42

ECLIPSES

ECLIPSES *of the third* Satellite.

September.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
				06	20	40	15
				14	00	40	33

October.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
19	18	08	42				
26	22	06	33				

November.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
03	02	03	43				
10	06	00	11				
17	09	55	54				
24	13	50	43	24	16	15	45

December.

Immerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.
01	17	45	25*	10	20	09	49
08	21	39	40	09	00	03	38
16	01	23	45	16	03	56	57
23	05	[illegible]	51	23	07	50	29
30	09	22	31	30	11	44	35

ECLIPSES

ECLIPSES *of the fourth* Satellite *for the Year* 1732.

	D.	H.	M.	S.	
January 15	at	11	59	52*	an Immerſion.
	at	13	59	54*	an Emerſion.

After which Time the *Satellite* will paſs wide of the Shadow of *Jupiter*; and there will be no more *Eclipſes* till the Beginning of the Year 1734.

IV. *A Letter to the Preſident of the Royal Society, from* Frank Nicholls, *M. D. F. R. S. giving an Account of a* Polypus, *reſembling a Branch of the* Pulmonary Vein, *coughed up by an* aſthmatic Perſon.

SIR,

NIcholas *Tulpius*, in the 7th Obſervation of his ſecond Book, preſents us with the Caſe of a Man who, with a large Effuſion of Blood, threw up, by coughing, two Branches of the *Pulmonary Vein*, ſix Inches long, with their ſeveral Ramifications, freed from the *Trachæa* and Subſtance of the Lungs, as if diſſected by the moſt accurate Anatomiſt. This Caſe he obſerves to be very extraordinary, and not to be parallell'd in the Writings of phyſical Authors.

A little Acquaintance with the Structure of the Lungs ſufficiently evinces the Impoſſibility of the Fact,

as

as there ſtated; wherefore (not doubting the Veracity of the Author) I always believed him to be deceived by a *Polypus* of the Vein, which might be cough'd up in the Manner by him deſcribed.

But the following Caſe will give another Light to this Affair. *July* the 18th 1730, I was conſulted by Mr. ——— of *Black Friars*, on Behalf of his Brother, living in *Eſſex*, who was aſthmatic, and cough'd up Phlegm reſembling Worms; to remedy which, I directed the Uſe of a *Lac Ammoniacum* with Squills; from the Uſe of which he expectorated more eaſily, but continued ſtill to cough up the ſame Subſtances.

The 11th Inſtant, on the Road to *London*, he was ſeized with a Shivering, and pleuretic Pains; a white Tongue, hard and quick Pulſe, *&c.* By repeated Bleeding his Pains decreaſed, but the Cough remained more violent than uſual. On examining the expectorated Phlegm (which was tinged with Blood) I found it fibrous, and (when expanded in Water) exactly reſembling the Veſſels in the Lungs. Theſe Subſtances are as tough as the Coats of the Veins, and (like them) hollow. Mr. —— has cough'd up more or leſs of them every Day, for ſeven Years; ſometimes perfectly white, and ſometimes tinged with Blood: Notwithſtanding which, he has had no other Complaint, has had a good Appetite, and Colour, and a greater Share of Fat than any Man would chooſe. The Specimen here ſhewn (as in Fig. 1.) was expectorated, when I was preſent, the 16th Inſtant. It nearly reſembles the firſt Draught of *Tulpius*, and is no more than a viſcid Phlegm, ſecreted by the relaxed Glands

of

of the *Trachæa*, and afterwards concreted by the Heat of the Part. As this may ſerve to explain the remarkable Caſe of *Tulpius*, ſo I thought it worth being communicated to the Society. I am,

With great Reſpect,

June 17. 1731. *Your very humble Servant,*

FRANK NICHOLLS.

V. *An Account of an Experiment explaining a mechanical Paradox,* viz. *that two Bodies of equal Weight ſuſpended on a certain ſort of* Balance [*as in* Tab. Fig. 2.] *do not loſe their* Æquilibrium, *by being removed one farther from, the other nearer to the Center. By the Rev.* T. J. Deſaguliers, *L. L. D. & F. R. S.*

Propoſition.

IF the two Weights P, W, in Fig. 3. hang at the Ends of the Balance A B, whoſe Center of Motion is C; thoſe Weights will act againſt each other (becauſe their Directions are contrary) with Forces made up of the Quantity of Matter in each multiplied by its Velocity; that is, by the Velocity which the Motion of the Balance turning about C will give to the Body ſuſpended. Now the Velocity of an heavy Body is its perpendicular Aſcent or Deſcent, as will appear

by moving the Balance into the Poſition *a b*; which ſhews the Velocity of P to be the perpendicular Line *e a*, and the Velocity of B will be the perpendicular Line *b g*: For if the Weights P and W are equal, and alſo the Lines *e a* and *b g*, their *Momenta* made up of *e a* multiplied into W, and *b g* multiplied into P, will be equal, as will appear by their deſtroying one another in making an *Æquilibrium*. But if the Body W was removed to M, and ſuſpended at the Point D, then its Velocity being only *f d*, it would be over-balanc'd by the Body P; becauſe *f d* multiplied into M, would produce a leſs *Momentum* than P multiplied into *b g*.

As the Arcs A *a*, B *b*, and D *d* deſcribed by the Ends of the Balance or Points of Suſpenſion are proportionable to their Sines *e a*, *g b*, and *d f*, as alſo the *Radii* or Diſtances C A, C B, and C D; in the Caſe of this common ſort of Balance, the Arcs deſcribed by the Weights, or their Points of Suſpenſion, or the Diſtances from the Center may be taken for the Velocities of the Weights hanging at A, B, or D; and therefore the acting Force of the Weights will be reciprocally as their Diſtances from the Center.

SCHOLIUM.

The Diſtances from the Center are taken here for the Velocities of the Bodies, only becauſe they are proportional to the Lines *e a*, *b g*, and *f d*, which are the true Velocities. For there are a great many Caſes wherein the Velocities are neither proportionable to the Diſtances from the Center of Motion of a Machine,

nor

nor to the Aris deſcribed by the Weights or their Points of Suſpenſion. Therefore it is not a general Rule, *that Weights act in Proportion to their Diſtances from the Center of Motion*; but a Corollary of the general Rule, *that Weights act in Proportion to their true Velocities*, which is only true in ſome Caſes. Therefore we muſt not take this Caſe as a Principle, which moſt Workmen do, and all thoſe People which make Attempts to find the *perpetual Motion*, as I have more amply ſhewn in the *Philoſophical Tranſaction*, N° 369.

But to make this evident even in the Balance, we need only take Notice of the following Experiment, Fig. 2. A C B E K D is a Balance in the Form of a Parallelogram paſſing thro' a Slit in the upright Piece N O ſtanding on the Pedeſtal M, ſo as to be movable upon the Center Pins C and K. To the upright Pieces A D and B E of this Balance are fix'd at right Angles, the horizontal Pieces F G and H I. That the equal Weights P, W, muſt keep each other in *Æquilibrio*, is evident; but it does not at firſt appear ſo plainly, that if W be removed to V, being ſuſpended at 6, yet it ſhall ſtill keep P in *Æquilibrio*; tho' the Experiment ſhews it. Nay, if W be ſucceſſively moved to any of the Points 1, 2, 3, E, 4, 5, or 6, the *Æquilibrium* will be continued; or if, W hanging at any of thoſe Points, P be ſucceſſively mov'd to D or any of the Points of Suſpenſion on the croſs Piece F G, P will at any of thoſe Places make an *Æqulibrium* with W. Now when the Weights are at P and V, if the leaſt Weight that is capable to overcome the Friction at the Points of Suſpenſion, C and K be ad-

ded to V, as *u*, the Weight V will overpower, and that as much at V as if it was at W.

From what we have ſaid above, the Reaſon of this Experiment will be very plain.

As the Lines A C and K D, C B and K E always continue of the ſame Length in any Poſition of the Machine, the Pieces A D and B E will always continue parallel to one another, and perpendicular to the Horizon: However, the whole Machine turns upon the Points C and K; as appears by bringing the Balance to any other Poſition, as *a b e d*: And therefore as the Weights applied to any Part of the Pieces F G and H I can only bring down the Pieces A D and B E perpendicularly, in the ſame Manner as if they were applied to the Hooks D and E, or to X and Y, the Centers of Gravity of A D and B E; the Force of the Weights (if their Quantity of Matter is equal) will be equal; becauſe their Velocities will be their perpendicular Aſcent or Deſcent, which will always be as the equal Lines 4 *l* and 4 L, whatever Part of the Pieces F G and H I the Weights are applied to. But if to the Weight at V be added the little Weight *u*, thoſe two Weights will overpower, becauſe in this Caſe the *Momentum* is made up of the Sum of V and *u* multiplied by the common Velocity 4 L.

Hence follows, that it is not the Diſtance *c* 6 multiplied into the Weight V, which makes its *Momentum*; but its perpendicular Velocity L 4 multiplied into its Maſs Q. E. D.

This is ſtill further evident, by taking out the Pin at K; for then the Weight P will over-balance the other

other Weight at V, becauſe then their perpendicular Aſcent or Deſcent will not be equal.

VI. *De Ingenti* Sanguinis Vomitu *perquàm* gelidiſſimis *brumali tempore* Potionibus *curato, Obſervatio ad Regiam Scientiarum Londinenſem Societatem à* Petro Antonio Michelotto *M. D. R. S. S. tranſmiſſa.*

QUUM Patritius Juvenis Præſtantiſſimus Ludovicus Maffetti, rure, ubi venatione, & perequitando ſe vehementer exercuerat, in urbem reverſus Sanguinem Decimo Calendas Januarias CIↃↃCC XXVIII. ad uncias quinque, ſexve matutinis temporibus vomeret, hujuſcemodi curationem inſtitui. Primùm, quòd Cruoris in Arterias, Venaſque vim, eas diſtendere continenter nitentem inſigniter, & præcipuè ex ſuperfluente Sanguineæ materiæ copia adauctam animadverterem; minimèque ignorarem ipſum Nobiliſſimum Juvenem laborare ſcyrrhoſo lienis tumore, ob quem, & Sanguinem vel hos ante quatuor annos evomuerat, & narium copioſis hæmorrhagiis à prima uſque adoleſcentia vere, & autumno quotannis tentari conſueverat; quæ, poſteaquam fortuitò à luſoribus follis capiti impactus fuerat, ferè ex toto defecerant; quòd hæc, inquam, minimè ignorarem, ad uncias circiter octo ex hæmorrhoidibus Sanguinem per hirudines protinus mitti, ejus copiæ demendæ, atque à liene, & ventriculo avertendæ cauſa præcepi; tùm aquam ex plan-

plantaginis ſucco, *corallato* nitro bene ſaturam cyathi menſura ſæpius eo die ſorbendam præbui ad Sanguinis fervorem compeſcendum. Sanguineo verò vomitu circà ſecundam noctis vigiliam vehementiùs urgente, ſub eoque, Sanguine maximo impetu copioſiſſimè ad os ruente, aquam ex lactucæ ſucco, *cydoniati* J. B. Helmontii *Laudani* guttis duodecim, unciarum quatuor pondo commiſtam confeſtim potui dedi, & Cruoris potiſſimùm velocitatis minuendæ, & ſomni acccerſendi ergô: quod medicamentum, quum Æger, Sanguine ex ventriculo tertiùm, quartùmque ingenti copia erumpente, rejiceret, ad catapotia ex perſici *philonii* ſcrupulis ſex, ex aqua ſucci Sanguinalis herbæ devoranda decurri. Sub idem tempus gelidam aquam frigido aceto permiſtam ore contineri, ſpongiamque perfrigido aceto benè imbutam epigaſtricæ regioni admoveri juſſi, ad ſanguifera ſtomachi vaſa, ſivè exeſa, ſivè rupta, ſivè quocunque modo patefacta conſtringenda: quem in finem, quandoquidem idem cruentus Vomitus quintùm, ſextùmque revertebatur, atque Æger exanimari videbatur, non modò ad confectionem ex contuſis albi papaveris, & hyoſciami ſeminibus roſaceo ſaccharo, armenia bolo, ac lapide hæmatite adjectis, ſemicochlearii pondere devorandam decurrebam; ſed ad conſolidantia quoque catapotia, quæ ſub Autore *Helvetio* Patre feruntur, quorum terni ſcrupuli quarta quoque hora aſſumebantur ex aqua modò commemorata, in qua modica pollinis ex margaritis, & rubris coralliis in calcem redactis, itemque ex *magiſterio* (ut Chymici loquuntur) oculorum cancrorum portio ſoluta erat. Per hæc auxilia conſecutus ſum, ut Sanguis per aliquot horas conquieverit.

A Sanguinis per ſectas Venas detractione ea nocte abſtinui: primùm, quòd Sanguinem ad libras duodecim, & ampliùs duarum circiter horarum ſpatio ex ore proceſſiſſe, jacentemque ob id, in conclavi frigido, paucis veſtimentis corpori injectis quietus animo linqui perſpicerem; tùm, quòd Cordis, & Arteriarum coagitatio, & quod conſequebatur, reſidui Cruoris pauciſſimi velocitas eſſet quam maxima; indè, quòd ad avertendum tantæ ſanguineæ materiæ à ventriculo curſum, exiguam Sanguinis emiſſionem, & parvo quidem tempore duraturam, ſivè ex parte ab ipſo affecto ventriculo minus remota, ſivè ex Vena quàm longiſſimè ab eo diſtante haud ſufficere, exiſtimarem; poſteà, quòd, vel per medicam, hujuſcemodi rebus circumſtantibus, Sanguinis detractionem, ſulphuratarum ſanguineæ maſſæ particularum ad coccineas maſſulas pænè ex toto deficientes proportionem jàm notabiliter (uti ex magna ſiti, corporis calore, brachiorum, & crurum jactatione, inſigniquè pulſus frequentia conjiciebam) increſcentem, una cum Sanguinis velocitate cruentum Vomitum rursùs excitare valente ſummoperè adaugeri poſſe, providerem.

Albente cœlo, Vomitu denuò reverſo, ad Sanguinem, qui notabili tum quoque copia evomebatur, ſupprimendum, frigidum ex urenti urtica Succum, cui toſti opii grana octo admiſta erant, ad uncias quatuor potandum obtuli; qui quum ex toto non reſponderet, ad extremum ratiocinando conſtitui, & Sanguinis Ductus in ventriculi cavum pertinentes ejus aerem condenſando comprimere, & Sanguinem ab iis ſupportatum reprimere perquàm gelidiſſimis potionibus quia verò cujuſquemodi generis cibos, ſivè ex contrito

trito pane, ſivè ex recentium ovorum vitellis, in gallinaceorum pullorum juſculis, ſolutis, ſivè ex ptiſana hordeacea, oryzæque cremore, Æger morbo fuſus, ſtomacho maximoperè languente reddebat, ſorbitiones virium imbecillitati ſuccurrentes, neque onerantes delegi: & primùm quidem ex *chioccolatte*; tùm ex vaccino lacte, & ſaccharo; indè ex hoc, & cremore ex dulcibus amygdalis, albique papaveris ſeminibus recèns expreſſo: cujuſmodi liquores frigoribus ex glacie & nitro conglaciati, ſcilicèt modò unus, modò alius quinta, ſextave quaque hora ad uncias circiter ſeptem hauriebantur, interpoſitis non multis quidem, ſed ſæpè nocte, ac die haud leviter ſitienti datis ex frigida Nucerina aqua potionibus. Quæ curandi via maximè, quemadmodum ego arbitror, rationalis mirificè quum conferret, in ea perſtiti ferè uſque ad Februarii menſis proximè inſequentis initium; quo tempore victum primis quidem diebus ex decocta in gallinaceo juſculo oryza, conſciſſove triticeo pane, eodem juſculo, benè madente, aut recenti ovo; in ſequentibus verò diebus ex carnibus quoque, modò gallinaceis, modò vitulinis, & interdùm ex avibus imperavi: prætereáque ad imbecillem ſtomachum confirmandum præſcripſi tincturæ ex abſinthio ſine vini ſpiritu extractæ guttas circiter ſexaginta quotidiè paulo ante prandium ex pimpinellæ herbæ aquæ cochleario ſumendas.

Prætereo, me tertio, quartove morbi die vaccinum lac, butyro, ovi vitello, ac rubro ſaccharo admiſtis in ultima inteſtina per clyſteres infundi, curaſſe ad atrum ſanguinem ex ventriculo ad inferiores partes defluentem educendum: quem propterea quòd craſſi ex fuligine

gine pulveris formam habere, animadverterem; à medicamentis ad Cruoris in ventriculi caveam effusi concretionem prohibendam, tollendamve, in quocunque Vomitu Sanguinis ab aliis medicis præscribi solitis abstinere, satius duxi, quàm iis propinatis, ad effectum à curatione per gelidissimas potiones jàm prosperè inceptum perficiendum vires adhibere videri, ejusmodi quamfrigidissimarum Cruorem cogentium sorbitionum viribus planè atque omninò contrarias.

Atque hac quidem ratione medendi splendidissimum Ægrotantem ad desperationem redactum ex gravissima, & periculosissima, de qua hactenus retuli, valetudine, Oculatissimis, Clarissimisque Urbis Medicis, B. Zendrino, & Jo.D. Santorino mihi testibus liberavi: cui, ne in eundem morbum deinceps relabatur, Sanguinis uncias septem octove, tertio quartove quoque mense mitti jubeo, plerumque ex brachiis, interdum ex hæmorrhoidibus. Istiusmodi autem præsidii genere ad Sanguinis profusionem prohibendam utendi, causa hæc est. Splenis scirrho supra commemorato, Sanguinei ad eum attinentes Ductus magnoperè obstructi eam Sanguinis copiam, cui continendæ apti creati sunt, profectò capere nequeunt; reliqui igitur corporis, & quod consequitur, eò magis ventriculi ipsi lieni propinqui canales Sanguinem ducentes, quantitatem ejus naturali majorem contineant, necesse est: hique propterea sic extrorsùm trudi, ac dilatari poterunt, ut Sanguini continenter ex ipsis manare conanti patefiant; sicuti plerumque contingit in maribus, fœminisque, quibus Sanguinis sputa, vomitus, aut ejus ex naribus profluvia propter insignes vasorum vel infimi ventris obstructiones fiunt. Sed

in *lienoſis præſertim copioſas, & immodicas Sanguinis ſuſque, deque rejectiones* vidiſſe ſe narrat Jo. Riolanus; hiſtoriaſque ex Hippocrate, & Valverda affert eorum, qui Sanguinis Vomitu ex turgente ſplene interiêre. Id ergò malum ne accideret, præcavendum mihi exiſtimabam repetita Sanguineæ materiæ detractione. Et quoniam Sanguinis in ſuos Ductus impetus velocitatis quoque incremento augeri poteſt; ob hoc, & aquæ frigidæ potum vini loco, & abſtinentiam à venatione, curſu, aliiſque ejuſcemodi Cruoris motum vehementer accelerare potentibus imperavi, & eventu ſanè ad ultimum uſque menſem Anni CIↃ IↃCC XXX. proſperrimo.

Nam eo anno poſtridiè Calendas Decembres in eundem Illuſtriſſimus, atque Excellentiſſimus, de quo retuli, Patritius Sanguinis Vomitum noctu relabitur. Ad eum viſendum protinus accitus; quandoquidem libram unam tantummodò, alteramve Sanguinis evomuerat, & plenitudinem boni adeſſe Cruoris videbam: quanquam cruenta Vomitio continuabat, & Arteriæ ſub ea penè ex toto ſubmittebant ſeſe; nihilominus tamen Sanguinis uncias circiter decem, ad eum à ventriculi ſanguiferis vaſis avertendum ex vena in lævo brachio ſecta, nulla interpoſita mora, mitti jubeo; indè liquidi Helmontii *Laudani* guttas quindecim, octodecimve ex pimpinellæ minoris aquæ unciis quatuor ſumendas præſcribo; atque hujuſmodi remedium ſomni inducendi, & cruoris velocitatis retardandæ cauſa in uſum vocatum, ter, quaterve, quòd Sanguinis Vomitu redeunte rejicicbatur, ea nocte ad propoſitum mihi finem conſequendum repetere coactus ſum.

Vomitus

Vomitus vix horas duas ſub hiſce auxiliis conquievit: eo autem ſemel, iterumque reverſo, ex hæmorrhoidibus quoque Sanguinem ad uncias circiter quatuor educi præcipio, eodemquè tempore ad quamgelidiſſimas, quæ aliàs feliciſſimè ceſſerant, optimèque nunc reſpondent in quadam Virgine profuſiſſimo Cruoris ex uteri vaſorum oppillationibus Vomitu ferè exinanita, ſorbitiones devenio: & primùm quidem ad *Chioccolatte*, tùm horis circiter quatuor exactis ad alios conglaciatos liquores, quos *Sorbetti* ex *Spumiglia*, & *Pappina*, vernacula Linguâ hîc appellant. Ex cujuſmodi artificiali gelu concretis liquidis, nempè modò ex uno, modò ex altero ad coercendum Vomitum, vireſque reficiendas non multum quidem, ne ventriculum morbo ſolutum onerarет, ſed ſæpè Æger fermè exanimis deguſtabat. Hujuſmodi per ſummè gelidas ſorbitiones curandi ratione, Cruoris maximè gaſtricis Arteriis ac Venis contenti motum valentiſſimè refrenare potente, obtinui, ut Vomitus ad inſequentem uſque diem quieverit; in quo bis reverſus, iiſdem quamgelidiſſimis potionibus pertinaciter tertia, quartave quaque hora repetitis iterùm compreſſus eſt.

Tertio mali die, Sanguinem quidem, at non in multa copia, Nobiliſſimo Ægrotanti denuò circa veſperam vomenti catapotia auri bracteis obvoluta, ad accerſendum Somnum, & ad Cordis atque arteriarum coagitationes præternaturales compeſcendas, devoranda ex aquæ tormentillæ herbæ ſucci unciis tribus dedi, quæ recipiebant perſici *philonii* grana triginta, toſti opii ſemiſcrupulum. Hæc autem adeò reſponderunt, ut, & Vomitus protinus ſedatus ſit, & lon-

giuſculus ſomnus noctu acceſſerit. Dum hæc adverſus Sanguinis Vomitionem gerebantur, alvus lacte, butyro, ſaccharo,- ac ovi vitellis commiſtis, & in inferiores partes infuſis, ſecundo, tertiove die ad nigrum Sanguinem ex ventriculo ad inteſtina ſub bilis atræ ſpecie jam quoque delapſum evacuandum ducebatur; aquaque prætereà ex millefolii ſucco, in qua cotoneum malum parumper ebullierat, glacie gelidiſſima reddita ad ſtomachum æſtu ſuo languidum erigendum, ad Ductus Sanguinem in eum importantes confirmandos, & ad ſitim, quæ die tertio urgere cœpit, moderandam ſæpius die, ac nocte, parcè tamen, ne Stomachus ipſe tunc multum admodum infirmus ad reſiſtendum obrueretur, potui dabatur.

Dies duodecim frigidiſſimam hanc, tenuiſſimamque victus rationem, ſub qua flatus quamplurimi per inferiora maximo cum crepitu deſcendebant, ſatis feliciter adhibui: poſt quod tempus, quum de ventriculi diſtendente dolore Ægrotus (quòd præmemorata glaciali aqua ad depellendam, qua continuò ardebat, ſitim abuſus eſſet) graviſſimè quereretur, illam dimiſi; atque in ipſius locum ſubſtitui victum paulò pleniorem ex calidis gallinaceorum pullorum juſculis, in quibus recentis ovi vitellus cum permodica ſucci ex limonio malo portione ſolutus erat. Quæ juſcula bis in die hauriebantur, interpoſita ſummis matutinis temporibus benè calida ex *Chioccolatte* ſorbitione, cui frigidæ aquæ potio, tùm ventriculi refrigerandi, tùm importunæ ſitis elidendæ ergô præmittebatur. Adverſus autem iſtiuſmodi permoleſtam ſtomachi diſtentionem præter calentes ſorbitiones, catapotia quoque modò propoſita inordinatos nervorum, & animalium

malium. Spirituum motus componendi virtute prædita propinavi.

Quartodecimo die dolor, & tumor ponè ſiniſtram aurem ad inferioris mandibulæ medium, & amplius ſeſe exporrigens, poſteaquam caput proximè antecedentibus diebus leviter doluerat, extemplò ſuboritur; eodemque tempore febris, quæ alioqui continens quidem, ſed nequaquam ingens erat cum levi frigore, & aliqua mentis turbatione intenditur. Contra quem dolorem calida, humidaque fomenta ex vaccini lactis, & aquæ ſimplicis, in quibus ſambuci flores decocti erant, partibus equalibus, ſpongiis admotis ſæpè repetenda præſcribo: per quæ humoris parotidam efficientis coitus intrà octo dies ferè ex toto ſolutus eſt. Poſt quod tempus febricula circà noctem paulum increſcens, mane ſe remittens continuabat; Æger ſiti non adeò cruciabatur, frigidam Nucerinam aquam potabat; interdiu vigilabat, noctu conquieſcebat; calidis, quas dixi, ſorbitionibus reficiebatur, & interdùm ptiſana quoque ex oryza utebatur. Natura vel dum benè valebat ructuoſus, aliquando conquerebatur de quibuſdam (ut ipſe aiebat) acidis ventriculum irritantibus, pituitæ, & nonnunquam alimentorum rejectum moventibus: adverſùs quæ abſinthii tinctura ſemel die circà meridiem, ſæpiùs frigida aqua ex Nucerino Fonte huc importata haud improſperè pugnabam; atque interdùm remedio perfici *philonii*, & toſti opii; interdùm quamgelidiſſima ex lacte, & ſaccharo, gelu artificiosè concretis, ſorbitione ad crebrò ructantem, calidiſque fermentationibus (quod ut facilè credam, haud leves ſunt cauſæ) commotum

ſtoma-

ſtomachum componendum proſpero ſucceſſu; noctu utebar.

Circà diem quadrageſimum aquoſi humoris Vomitus decedebat; Arteriæ naturaliter ordinatæ erant; venter quotidiè ſatis; copioſam verò urinam veſica reddebat; & vires, ac ciborum appetentia accedebant ſic, ut valentiorem cibum, frigidum videlicèt ex cervino cornu, & vitulinis pedibus gluten Convaleſcenti paulo antequam nutrientia juſcula ſupra commemorata ſorberet, quotidiè ter oporteret offerre. Ab ejuſmodi alimenti genere primum ad oryzam in capi juſculo coctam, & gallinacea jecinora elixa; indè ad tenerarum gallinarum, vitulorum, coturnicumque carnes tranſiit: edulio ex vaccino lacte, recentis ovi vitello, & tantilla ſacchari portione, ad cochlearium unum, aut alterum commanducato, alvi movendæ gratia. Atque in præſentia ſanus eſt, & benèvalet. D. Venetiis Quinto Calendas Februarias CIↃIↃCCXXXI.

Animadverſio.

Propoſitum Sanguinis Vomitum per conglaciatas, quas recenſui, ſorbitiones ſupprimendi rationem, quamſolidiſſimis ratiocinationibus eſſe innixam, demonſtratu haud ità difficile eſt. Primùm namque ſanguiferi ductus Sanguinem in ventriculi cavum, ſivè rapturâ, ſivè eroſione, ſivè raritudine propriarum tunicarum, ſivè orum ſuorum aperturâ profundentes, glacialis ejuſmodi congelatarum celeriter in ventriculum defluentium potionum frigoris vi, nulla re interpoſita tacti, quaſique peruſti, quàm citiſſimè, validiſſimèque

lidiſſimèque fieri poteſt, corrugantur; tùm Sanguis his ipſis Ductibus contentus vehementiſſimè cogitur, atque in majores canales repellitur; deindè toto corpore ob idem gelidiſſimum frigus inhorreſcente, reliquum Sanguinis in ſuis motibus lationis, & agitationis multum admodum retardatur, ac proin ejus impetus ex Cordis, & Arteriarum pulſus velocitate enaſcens, arterioſorum, venoſorumque canalium extremis orificiis patefaciendis peropportunus notabiliter imminuitur; poſteà illæ ipſæ quamgelidiſſimæ potiones ex ſatis nutrientibus maſſulis coagmentatæ per notiſſimas chyli vias Sanguinis alveos influentes reſidui Cruoris particulas, congregando abſque ullo impetu reficiunt. Quum igitur, quam expono, adversùs Sanguinis Vomitum pugnandi ratio, & ventriculi vomendi conatus cohibere, & Sanguinem ſiſtere pluribus de nominibus valeat; ſubveniendique inſuper, et promptè quidem imbecillitati Ægrotantis ſufficienti virtute polleat: ecquis Saniorum ſaltem Medentium jam eſt, qui eam & maximè rationalem, & efficaciſſimarum in Cruorem vomentibus virium eſſe, non fateatur?

Pulcherrimam Aretæi ex Cappadocia græco-latinam editionem *Oxonia* ad me tranſmiſſam inſpicienti mihi, Sanguinis Rejectionis Curatio, Acutorum morborum Libro Secundo ab eo propoſita ſub aſpectum venit. Quum autem hanc perlegerim ad eum locum deveni, ubi *præſentiorem medicinam in iis, quæ bibuntur, & devorantur*; eſſe, ait, quorum ſpeciem triplicem exiſtere ſubjicit; *vel ut vaſa cogendo, compremendoque fluxionis ductus quaſi ligent*; *vel ut effluentem humorem incraſſent, atque congelent, quo minus ef-*

fun-

fundatur, quanquam exitus pateat ; vel ut vias exiccent, Sanguinem intrà ſedem antiquam retinendo, ne profluvio loci exinaniti maneant, & in eam partem exundent, ubi facta eſt effuſio.

Miles ille in Græcorum Veterum Medica Diſciplina gloriarum pleniſſimus, qui cujuſdam Georgii *Schmidt*, Corcyræ Nigræ ficti Medici cognomine Perſonatus, clamoſo libello ranæ ad inſtar clamitans ranunculorum vim maximam hos ante ſex annos in me commiovit: Miles, inquam ille Glorioſus (ut Plautina phraſi dicam) *cujus ego legiones difflavi Spiritu*, ex hiſce Aretæi verbis: *cogendo, comprimendo ; quaſi ligent, atque congelent:* colligi poſſe, quòd Sanguinis Vomitum, cujus Hiſtoriam cum Medica Republica communico, curandi methodus ſola ratione hoc in caſu à me inventa, in ejuſdem Cappadociæ Medicorum Principis De Curatione Sanguinis Rejectionis Capite contineatur, procul dubio dictitabit. Verum enimverò, id à veritate omninò abhorrere, evidentiſſimum fiet, remedia, quæ *valida*, & ad *concretionem efficacia* idemmet vocat Aretæus, perpendenti. Non enim glaciem, nivem, aut quos ego adhibui, conglaciatos liquores ad vaſorum compreſſionem, & Sanguinis, quam cæteroqui neceſſariam cognoſcis, concretionem inducendam proponit ; ſed ſimplicem *poſcam ; plantaginis, vuæ acerbæ, ſanguinalis herbæ, ſeridis, coriandrive cum aceto ſuccum ; aridam acaciam ; leporis, hinnuli, aut hædi coagulum ; terram Samiam, Etreriam, ſigillatamque Lemniam ; corallium, ſapam Creticam, paſtillos ex Ægyptia Spina*, atque hujus generis alia multa, quæ hîc referre piget. Quod ad alimenta attinet ; ea adſtringentia

gentia quidem, & facultate refrigerantia, vel tactu frigida esse debere, scribit: at verò mentionem tantummodò injicit *elotæ alicæ, oryzæ in posca, palmularum decocti, tosti panis sicci, contusi in farinæ speciem cribro trajecti:* ex quibus *Sorbitiones cum oleo (cui thymbra inspergi potest sale condita, cum rhoe) faciendas esse, præcipit. Si ex profusione mors timeri possit: injucunda etiam, & concoctu difficilia esse præbenda, ex galla arida contrita lenti siccæ, frigidæque inspersa, atque ova inter coquendum crassa effecta,* tradit. Atque his utendum esse inculcat, si *adstringere, & refrigerare* in animo habeamus. *Sanguinem* autem, & *spiritum incrassantia* auxilia recensens: ad hoc præstandum, *Sorbitiones ex lacte, amylo; aut ex alica modò cum amylo, modò cum lacte; alicamque præterea cum palmulis coctam, & ad consistentiam optimè perductam cum amylo, vel lacte, vel farre Thyrreno; itemque milium cum lacte,* atque horum similia maximè valere, perhibet.

Ut itaque leniori epilogo Militi nostro Glorioſissimo satisfaciamus: quum Aretæi neque alimenta, neque medicamenta adversùs Sanguinis vel à liene profusiones; conglaciatarum, quas Inclyto meo Ægrotanti cùm rejectûs Sanguinis supprimendi, tùm virium leviſſimo, gratiſſimoque cibi genere sustinendarum causa dedi, sorbitionum virtutibus æquales similesve obtineant facultates; hæque ab illis plurimùm differant: nemo deinceps suspicari poterit, meam, antè recensitum Sanguinis Vomitum, per quam gelidiſſimas, summis frigoribus, propinatas potiones edomandi, comprimendique methodum ab Aretæi fontibus emanasse. Si in supra allegatis Aretæi ver-

bis eam, de qua disputatur, curandi viam reapse subesse, idem Philogræculus Miles, ad Graiorum Medicæ Artis principum (quos *supèrûm* consiliis instructos credit) scripta, tanquam ad Sibyllinos libros adhæresens noviſſet: eam profectò, quatuor circiter abhinc annis, nimirùm dùm Patritio nostro Sanguinem copiosissimè primùm Evomenti unà cum aliis Medicis assideret, adhibuisset. At sub ejus curandi forma per largas, repetitasque Sanguinis detractiones, & medicamenta nitrum recipientia ex Clarissimo Georg. Stahlio excerpta Æger longo vitæ curriculo Dignissimus moriturus esset: mea autem opera à mortis limine revocatus est. Sed Philogæculum dimittamus: ad glaciali frigore curandi rationem revertamur.

Viri Eruditissimi Thomæ Bartholini de Nivis usu Medico libellum nuperrimis diebus quum evolverem, inveni non Abensinam modò potionem nive refrigeratam in calidis ventriculi passionibus imperare, sed & Galenum. Hic, eodem referente Bartholino, Senecam, *solutum & æstu suo languidum stomachum perurente frigore erigendum esse*, in Naturalibus quæstionibus scribentem fortasse secutus: in ventriculo curando refrigerationem sibi proponit per aquam, cibos, fructus nive refrigeratos. * *Vidisti*, iniquit, *& tu quosdam uno die, vel potius hora, frigida potione levatos; quorum aliis non aquam modo dedi fontanam recentem, sed etiam quæ nive esset refrigerata, veluti Romæ præparare solent: cibos præterea ad eundem modum refrigeratos identidem me illis permittere vidisti: iisdem dedi, & ptisanam probè coctam pariratione refrigeratam, aliaque id genus sexcenta.*

* *Lib.* vii. *Met. Med. Cap.* iv.

Præter

Præter Abenſinam, & Galenum, Rhaſem quoque Zacutum, Amatumque Luſitanos, Lud. Septalium, Laz. Riverium, atque alios, qui ad percalidum ventriculum multùm infrigidandum, colicoſque ex calidis, ac bilioſis humoribus coortos dolores depellendos cibo, & potu gelido, & frigida aqua in linteolis ventri impoſita uſi ſunt, adducit idem Bartholinus: qui autem Sanguinis rejectiones, effluentiaſve ex quacunque corporis noſtri parte, potionibus nive, vel glacie, quam frigidiſſimis redditis; aut alius generis gelidiſſimis ſorbitionibus curarint, profert neminem. Quod ad me attinet: conglaciatos ex melonum ſeminum cremore, & modico Saccharo liquores parca manu circà primum veſperum oblatos ſatis fæliciter hiſce frigidiſſimis diebus expertus ſum in juvenilis ætatis, & fervidæ temperiei Moniali ex Patritia Ericciorum Familia quamſplendidiſſima; quæ ventriculi nervorum ſpaſmo ab vehementi moeſtitia ortum ducente, lævumque ejus orificium ità conſtringente, ut, & gravem, ſuſpirioſamque reſpirationem efficeret, & cùm eſculentorum, tùm potulentorum vel parciſſimè aſſumptorum deſcenſum penè ex toto prohiberet, graviter vexabatur.

Hippocrates, quanquam *frigida, veluti nivem, & glaciem Sanguinis Eruptiones inducere,* ſcribit Aphor. Sect. V. Aph. XXIIII. nihilo tamen ſecius Aphor. XXIII. aſſerit: *in his frigida uti oportere, unde ſanguis erumpti, aut erupturus eſt, & quidem circà ipſas partes, unde fluit.* Memini, me ſex circiter abhinc annis, Sanguinis ingens ex utero profluvium, communibus medicamentis, & ne perfrigida quidem aqua quicquam proficientibus, promptiſſimè in Meritiſſima Matrona, media æſtate ſùppreſſiſſe, perurente glacie genibus, & cruribus ſuper impoſita, cruralibus,

& quod conſequitur, iliacis, aliiſque in uterum deſinentibus Arteriis, ac Venis maximopere coarctatis, repreſſoque propterea, ac veluti ab conſuetis viis intercluſo Sanguine.

Verumtamen, tametſi quam gelidiſſimas, quas ſæpius commemoravi, ſortibiones adverſùs cujuſquemodi profluvia Sanguinis, & maximè ex ventriculo, ab immodico Sanguinei amnis fervore, & accelerato motu enata, aut cum his conjuncta, & in juvenibus potiſſimùm, quibus cruor, & ſtomachus ex æſtuat, magnoperè collaudo: non ideò tamen ſuadere auſim, ut illæ ipſæ conglaciatæ ſorbitiones mulieribus Sanguinem ex partu vomentibus, aut frigidis ventriculi, atque inteſtinorum fermentationibus obnoxiis ſine ullo diſcrimine propinentur. In Sanguinis ex partu vomitionibus: uti neque *multa calida aqua lavarem*, neque *tepefactoria* (quemadmodum Hippocrates tùm in libro de Morbis Muliebribus, tùm in eo, quem de Natura Muliebri inſcripſit, indiſcriminatim præcipit) tàm facilè adhiberem: ſic aſininum, & vaccinum lac ab eodem Hippocrate iis in caſibus præſcriptum haud quaquam planè damnarem. Sanguinem, inquam, ex lochiorum ſuppreſſione, aut imminutione evomentibus; primum venas in pedibus ſecari ad Sanguinem à ventriculo revocandum; tùm calidis fomentis ex aqua, & albo vino, in quibus emollientes, aperienteſque herbæ ebullierint, hypogaſtricam regionem frequentiſſimè foveri, cruraque, & pedes eodem tempore multa calida aqua lavari juberem ad uteri vaſa reſeranda; indè ad lac, humectandæ & reficiendæ ſanguineæ maſſæ cauſa, tranſirem. Sin verò mulieri ſanguinem vomendo rejicienti puerperii purgationes naturaliter fluerent, non ca-

lidis

lidis fotibus, & lavacris, ſed remediis Sanguinis impetum ſedantibus, ejus calorem cogendo moderantibus, confirmantibuſque vaſa ventriculi, ad ſingulas circumſtantes res attentè reſpiciendo, cruentum vomitum ſupprimere pertentarem. Eo autem compreſſo ad lacteam diætam, vel hac non conferente, ad reficientes potiones ex *Chioccolatte*, nutrientibus gallinaceorum pullorum, ranarum, terreſtriumve teſtudinum juſculis, atque horum ſimilibus devenirem.

F I N I S.

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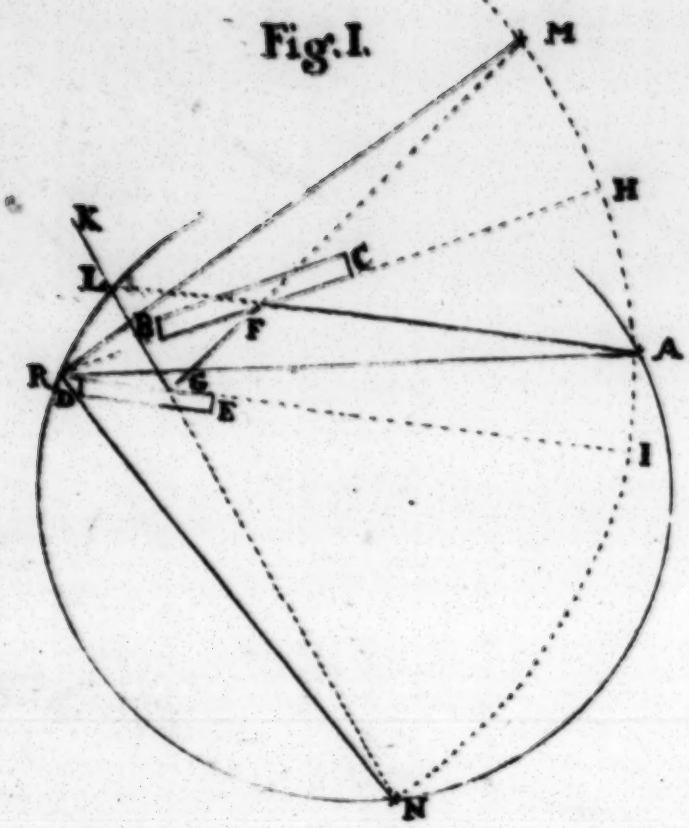
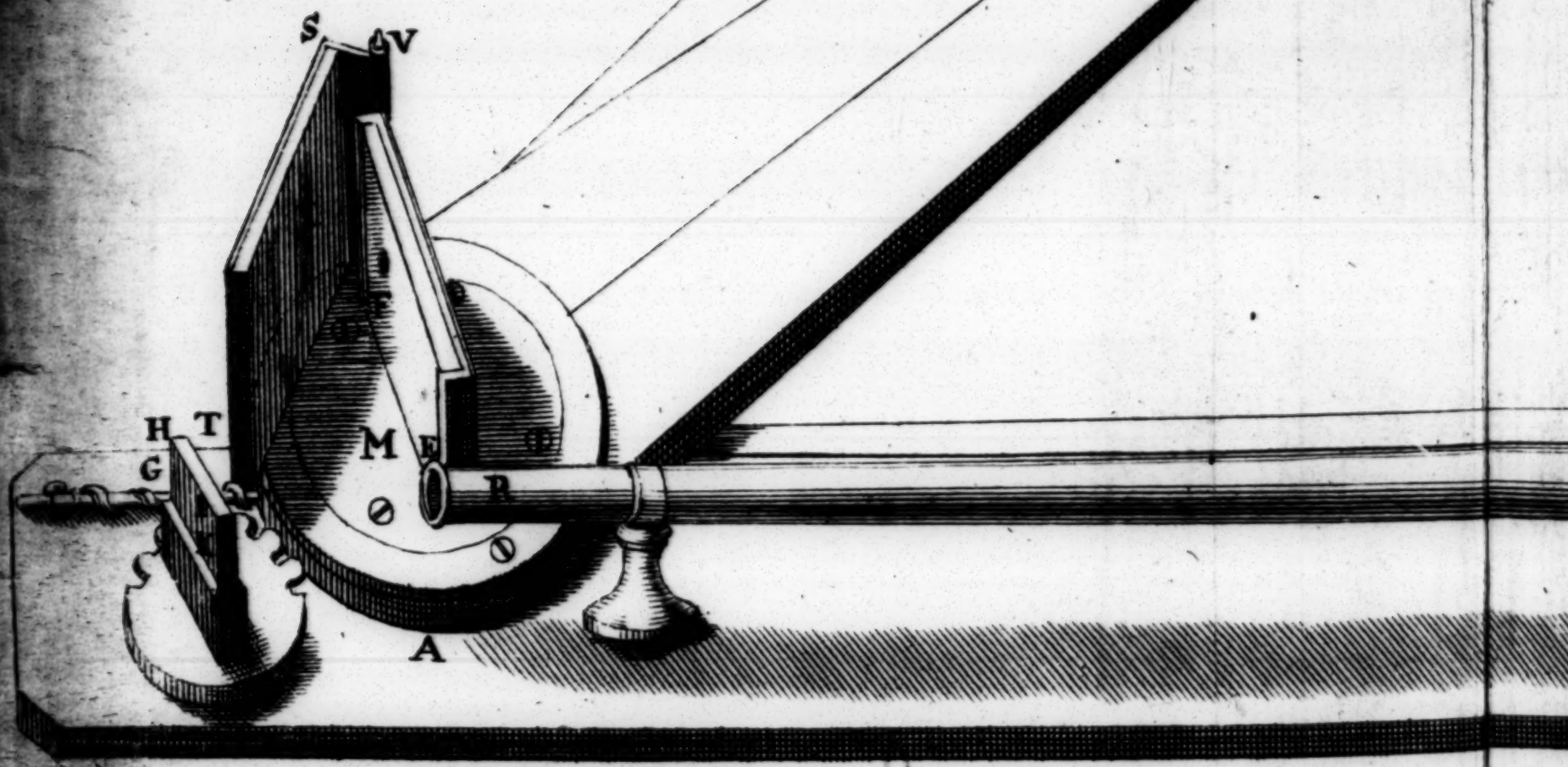
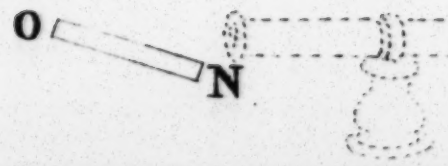
Jos: Banks

I. *The*

Fig. I.







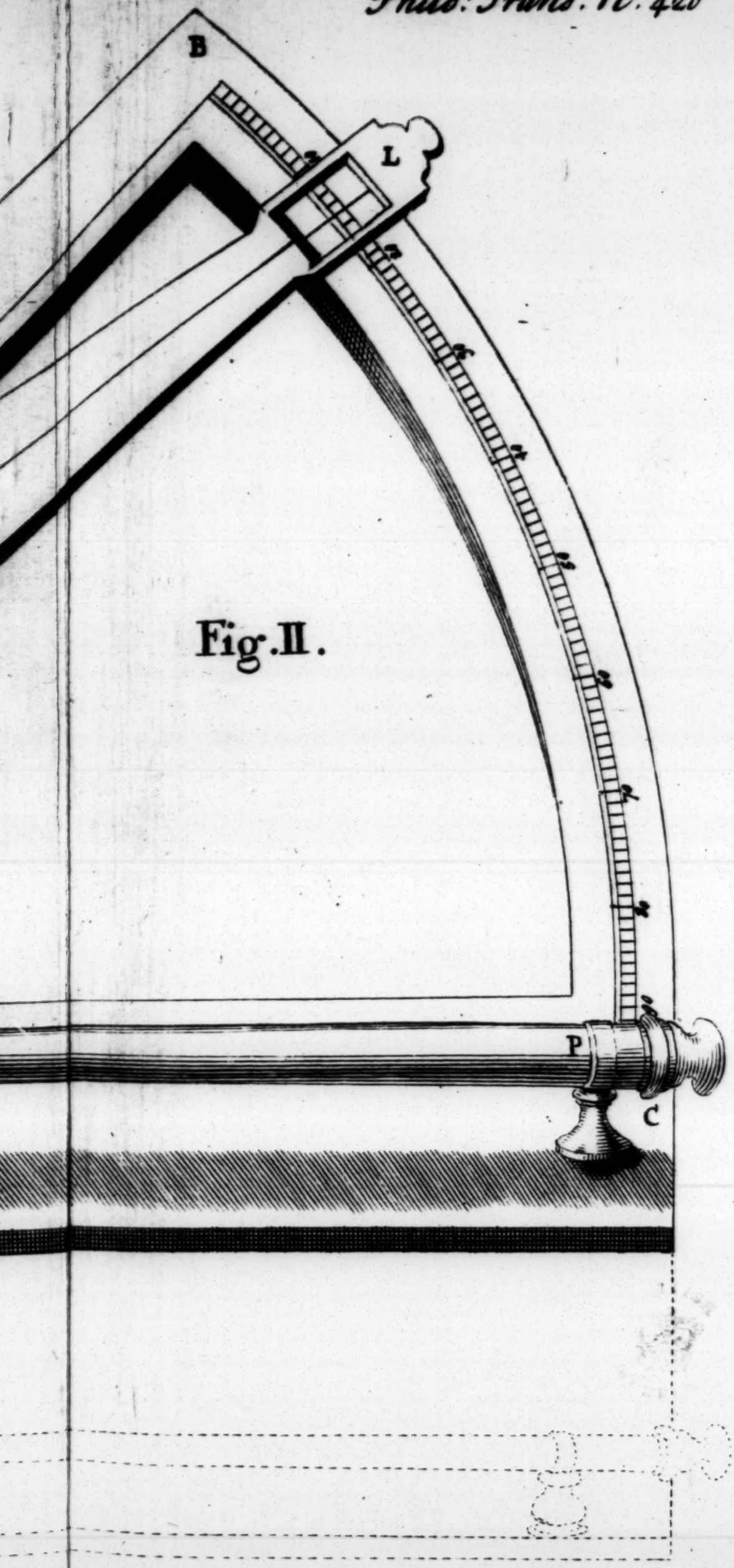


Fig. II.

Fig. IV.

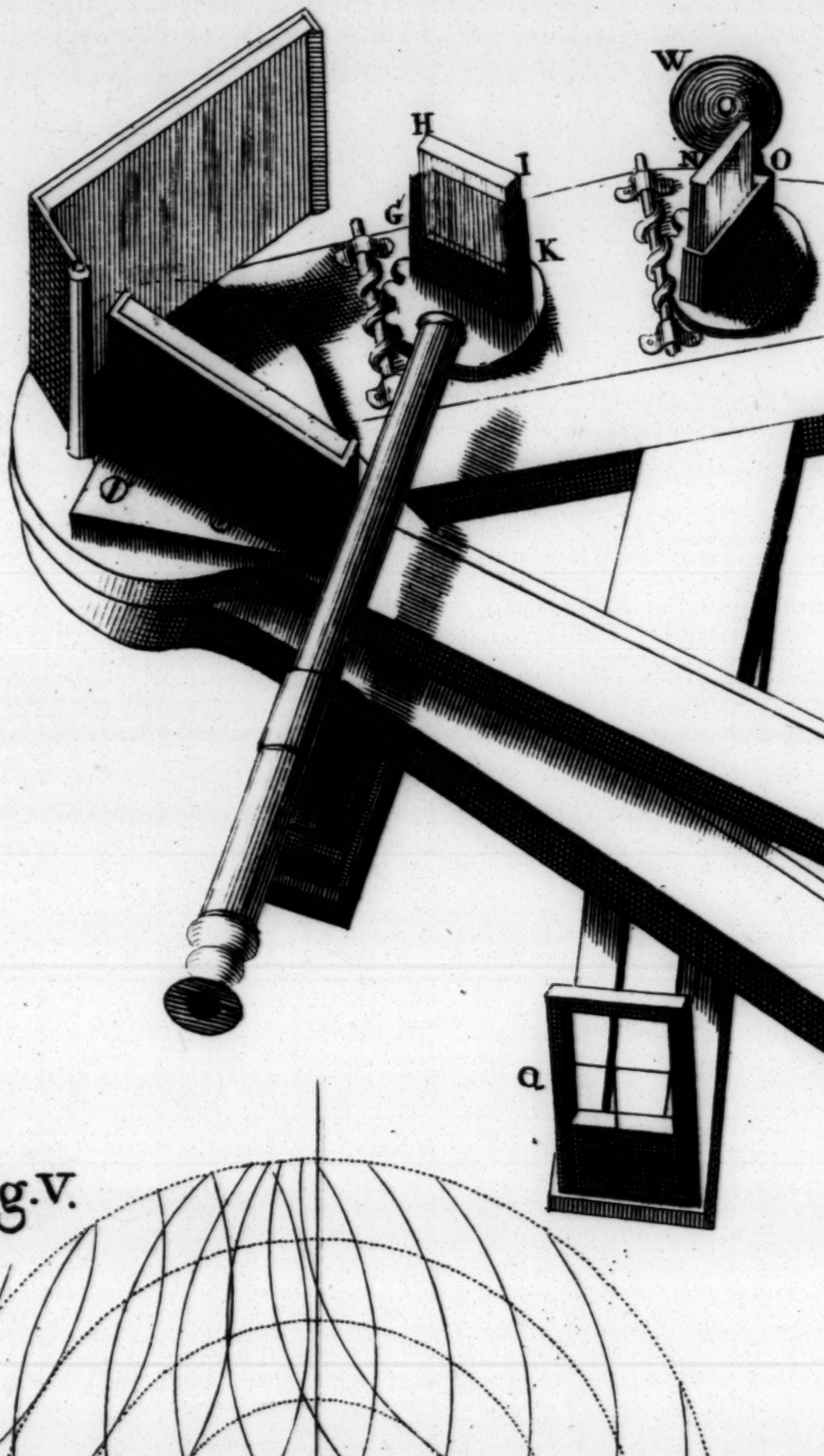
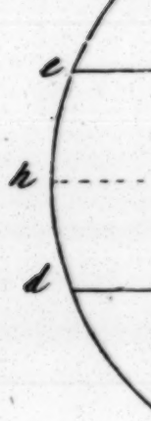


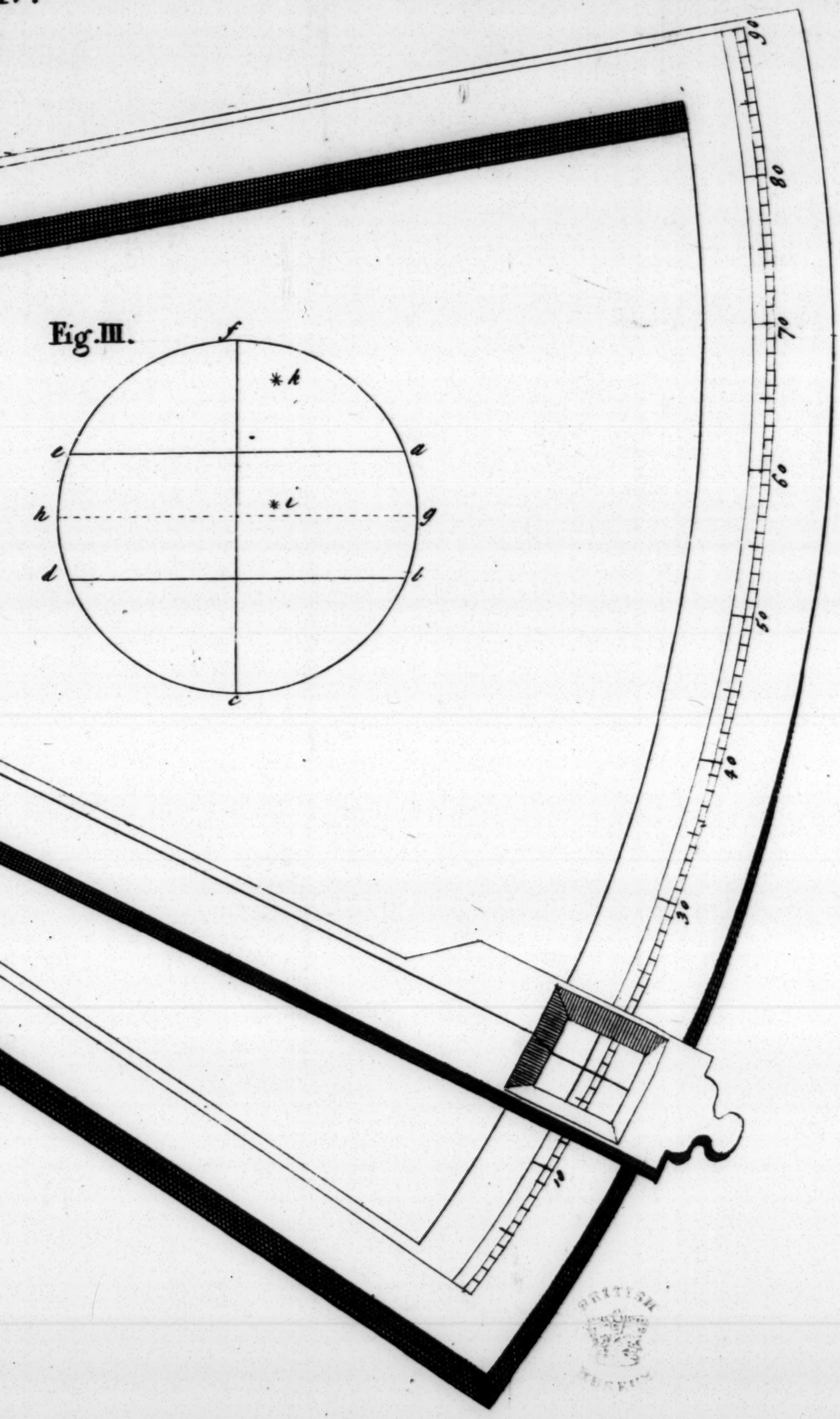
Fig. V.

Fig. II



IV.

Fig. III.



BRITISH MUSEUM

I.

I. *The Description of a new Instrument for taking* Angles. *By* John Hadley, *Esq; Vice-Pr. R. S. communicated to the Society on* May 13. 1731.

THE Instrument is design'd to be of Use, where the Motion of the Objects, or any Circumstance occasioning an Unsteadiness in the common Instruments, renders the Observations difficult or uncertain.

The Contrivance of it is founded on this obvious Principle in Catoptricks: That if the Rays of Light diverging from, or converging to any Point, be reflected by a plane polish'd Surface, they will, after the Reflection, diverge from, or converge to another Point on the opposite Side of that Surface, at the same Distance from it as the first; and that a Line perpendicular to the Surface passing through one of those Points, will pass through both. Hence it follows, that if the Rays of Light emitted from any Point of an Object be successively reflected from two such polish'd Surfaces; that then a third Plane, perpendicular to them both, passing through the emitting Point, will also pass through each of its two successive Images made by the Reflections: All three Points will be at equal Distances from the common Intersection of the three Planes; and if two Lines be drawn thro' that common Intersection, one from the original Point in the Object, the other from that Image of it which is made by the second Reflection; they will compre-

hend an Angle double to that of the Inclination of the two poliſh'd Surfaces.

FIG. I. Let R F H and R G I repreſent the Sections of the Plane of the Figure by the poliſh'd Surfaces of the two Specula B C and D E, erected perpendicularly thereon, meeting in R, which will be the Point where their common Section, perpendicular likewiſe to the ſame Plane, paſſes it, and H R I is the Angle of their Inclination. Let A F be a Ray of Light from any Point of an Object A falling on the Point F of the firſt Speculum B C, and thence reflected into the Line F G, and at the Point G of the ſecond Speculum D E reflected again into the Line G K, produce G F and K G backwards to M and N, the two ſucceſſive Repreſentations of the Point A; and draw R A, R M, and R N.

Since the Point A is in the Plane of the Scheme, the Point M will be ſo alſo by the known Laws of Catoptricks. The Line F M is equal to F A, and the Angle M F A double the Angle H F A or M F H; conſequently R M is equal to R A, and the Angle M R A double the Angle H R A or M R H. In the ſame manner the Point N is alſo in the Plane of the Scheme, the Line R N equal to R M, and the Angle M R N double the Angle M R I or I R N: Subſtract the Angle M R A from the Angle M R N, and the Angle A R N remains equal to double the Difference of the Angles M R I and M R H, or double the Angle H R I, by which the Surface of the Speculum D E is reclin'd from that of B C; and the Lines R A, R M and R N are equal.

Co-

Corol. 1. The Image N will continue in the ſame Point; altho' the two Specula be turn'd together circularly on the Axis R, ſo long as the Point A remains elevated on the Surface of B C: provided they retain the ſame Inclinatio..

Corol. 2. If the Eye be plac'd at L, (the Point where the Line A F continued cuts the Line G K;) the Points A and N will appear to it at the angular Diſtance A L N, which will be equal to A R N: For the Angle A L N is the Difference of the Angles F G N and G F L; and F G N is double F G I; and G F L double G F R, and conſequently their Difference double F R G or H R I: Therefore L is in the Circumference of a Circle paſſing through A, N, and R.

Corol. 3. If the Diſtance A R be infinite, thoſe Points A and N will appear at the ſame angular Diſtance, in whatever Points of the Scheme the Eye and Specula are placed: Provided the Inclination of their Surfaces remain unaltered, and their common Section parallel to itſelf.

Corol. 4. All the Parts of any Objects will appear to an Eye viewing them by the two ſucceſſive Reflections, as before deſcribed, in the ſame Situation as if they had been turn'd together circularly round the Axis R, keeping their reſpective Diſtances from one another, and the Axis, with the Direction H I, *i. e.* the ſame Way the ſecond Speculum D E reclines from the firſt B C.

Corol. 5. If the Specula be ſuppos'd to be at the Center of an infinite Sphere; Objects in the Circumference of a great Circle, to which their common Section is perpendicular, will appear remov'd by the two

Reflections, through an Arch of that Circle, equal to twice the Inclination of the Specula, as is before ſaid. But Objects at a Diſtance from that Circle will appear removed thro' the ſimilar Arch of a Parallel: Therefore the Change of their apparent Place will be meaſured by an Arch of a great Circle, whoſe Chord is to the Chord of the Arch equal to double the Inclination of the Specula, as the Sines Complements of their reſpective Diſtances from that Circle are to the Radius: And if thoſe Diſtances are very ſmall, the Difference between the apparent Tranſlation of any one of theſe Objects, and the Tranſlation of thoſe which are in the Circumference of the great Circle aforeſaid, will be to an Arch equal to the verſed Sine of the Diſtance of this Object from that Circle, nearly as double the Sine of the Angle of Inclination of the Specula, is to the Sine Complement of the ſame.

FIG. II. The Inſtrument conſiſts of an Octant A B C, having on its Limb B C an Arch of 45 Degrees, divided into 90 Parts or half Degrees; each of which anſwers to a whole Degree in the Obſervation. It has an Index M L moveable round the Center, to mark the Diviſions: And upon this, near the Center, is fix'd a plane Speculum E F perpendicular to the Plane of the Inſtrument, and making ſuch an Angle with a Line drawn along the middle of the Index, as will be moſt convenient for the particular Uſes the Inſtrument is deſigned for; (for an Inſtrument made according to Fig. 2. the Angle L M F may be of about 65 Degrees.) I K G H is another ſmaller plane Speculum, fix'd on ſuch Part of the Octant as will likewiſe be determin'd by its particular Uſe, and having its Surface in ſuch Direction, that when the Index is brought to mark

the

the beginning of the Diviſions (*i. e.* 0°) it may be exactly parallel to that of the other; this Speculum being turned towards the Obſerver, and the other from him. P R is a Teleſcope fix'd on one Side of the Octant, having its Axis parallel to that Side, and paſſing near the middle of one of the Edges I K or I H of the Speculum I K G H; ſo that half its Object-Glaſs may receive the Rays reflected from that Speculum, and the other half remain clear to receive them from a diſtant Object. The two Specula muſt alſo be diſpos'd in ſuch manner, that a Ray of Light coming from a Point near the middle of the firſt Speculum, may fall on the middle of the ſecond in an Angle of 70 Degrees or thereabouts, and be thence reflected into a Line parallel to the Axis of the Teleſcope, and that a clear Paſſage be left for the Rays coming from the Object to the Speculum E F by the Side H G. S T is a dark Glaſs fix'd in a Frame, which turns on the Pin V; by which Means it may be plac'd before the Speculum E F, when the Light of one of the Objects is too ſtrong: Of theſe there may be ſeveral.

FIG. III. In the diſtinct Baſe of the Teleſcope, repreſented by the Circle *a b c d e f*, are placed three Hairs, two of which, *a c* and *b d*, are at equal Diſtances from, and parallel to the Line *g h*, which paſſes through the Axis, and is parallel to the Plane of the Octant: The third *f c* is perpendicular to *g h* through the Axis.

The Inſtrument, as thus deſcribed, will ſerve to take any Angle not greater than 90 Degrees; but if it be deſign'd for Angles from 90 to 180 Degrees, the poliſh'd Surface of the Speculum E F (Fig. 2.) muſt be turn'd towards

towards the Obſerver; the ſecond I K G H muſt be brought forward to the Poſition N O ſo as to receive on its Middle the Rays of Light from the middle of the firſt in an Angle of about 25 Degrees, their Surfaces being perpendicular to one another when the Index is brought to the End of the divided Arch next C; and this ſecond muſt ſtand five or ſix Inches wide of the firſt, that the Head of the Obſerver may not intercept the Rays in their Paſſage towards it, when the Angle to be obſerv'd is near 180°. The ſmaller Speculum is fix'd perpendicularly on a round braſs Plate, tooth'd on the Edge; and may be adjuſted by an endleſs Screw.

In order to make an Obſervation, the Axis of the Teleſcope is to be directed towards one of the Objects, the Plane of the Inſtrument paſſing as near as may be through the other, which muſt lie to that Hand of the Obſerver, as the particular Form of the Inſtrument may require; *viz.* the ſame Way that the Speculum E F does from 1 K G H, if it be compoſed according to this Figure and Deſcription. The Obſerver's Eye being applied to the Teleſcope, ſo as to keep ſight of the firſt Object; the Index muſt be moved backward and forward till the ſecond Object is likewiſe brought to appear through the Teleſcope, about the ſame Diſtance from the Hair *c f* (Fig. 3.) as the firſt: If then the Objects appear wide of one another, as at *i* and *k*, the Inſtrument muſt be turn'd a little on the Axis of the Teleſcope, till they come even, or very nearly ſo, and the Index muſt be remov'd till they unite in one, or appear cloſe to one another in a Line parallel to *c f*, both of them being kept as near the Line *g h* as they can. If the Inſtrument be then

turn'd

turn'd a little on any Axis perpendicular to its Plane, the two Images will move along a Line parallel to *g h*, but keep the ſame Poſition in reſpect of one another; ſo that in whatever Part of that Line they be obſerved, the Accuracy of the Obſervation will be no otherwiſe affected than by the Indiſtinctneſs of the Objects. If the two Objects be not in the Plane of the Inſtrument, but equally elevated on, or depreſs'd below it, they will appear together at a Diſtance from the Line *g h*, when the Index marks an Angle ſomething greater than their neareſt Diſtance in a great Circle; And the Error of the Obſervation will increaſe nearly in Proportion to the Square of their Diſtance from that Line; but may be corrected by help of the fifth Corollary. Suppoſe the Hairs *a e* and *b d*, each at a Diſtance from the Line *g h*, equal to $\frac{200}{4146}$ of the focal Length of the Object-Glaſs, ſo as to comprehend between them the Image of an Object, whoſe Breadth to the naked Eye is a little more than $2^{\circ}\frac{1}{4}$; and let the Images of the Objects appear united at either of thoſe Hairs: Then as the Sine Complement of half the Degrees and Minutes mark'd by the Index, is to the doubled Sine of the ſame; ſo is one Minute to the Error which is always to be ſubſtracted from the Obſervation. Other Hairs may alſo be plac'd in the Area *a b c d e f*, parallel to *g h*, and at Diſtances from it proportional to the ſquare Roots of the Numbers 1, 2, 3, 4, *&c.* and then the Errors to be ſubſtracted from the ſame Obſervation made at each of thoſe Hairs reſpectively, will be in Proportion to the Numbers 1, 2, 3, 4, *&c.* This Correction will always be exact enough if the Obſerver take

care

care (eſpecially when the Angle comes near 180°) to keep the Plane of the Inſtrument from varying too much from the great Circle paſſing thro' the Objects.

In regard to the Workmanſhip, if an Exactneſs be required in the Obſervations, the Arch ought to be divided with the greateſt Care; becauſe all Errors committed in the Diviſion are doubled by the Reflections. The Index muſt have a ſteady Motion on the Center, ſo that the Axis of it remain always perpendicular to the Plane of the Octant; for if that alter, it will be liable to vary the Inclination of the Speculum it carries to the other: The Motion muſt likewiſe be eaſy, leſt the Index be ſubject to bend edge-ways: For the ſame reaſon it ſhould be as broad at that End next the Center as conveniently can be. The Specula ſhould have their Surfaces of a true flat; becauſe a Curvature in either of them, beſide rendering the Object indiſtinct, will vary its Poſition, when ſeen by Reflection from different Parts of them: They muſt alſo be of a ſufficient Length and Breadth for the Teleſcope to take in a convenient Angle without loſing the Uſe of any Part of the Aperture of its Object-Glaſs, and that in all the different Poſitions of the Index. They may be either of Metal or Glaſs Plates foil'd, having their two Surfaces as nearly parallel as they can; yet a ſmall Deviation may be allowed; provided either their thickeſt or thinneſt Edges (and conſequently the common Section of their Surfaces) be parallel to the Plane of the Octant: For in that Caſe, though there are ſeveral Repreſentations of the Object, they will be always very near one another in a Line parallel to *c f*; and any of them may be

uſed,

uſed, except when the Angle to be obſerved is very ſmall. The chief Inconvenience will be, that a ſmall Star will be more difficultly diſcerned, the Light being divided among the ſeveral Images. The Teleſcope may be contrived to alter its Situation, ſo as to receive the reflected Rays on a greater or leſs Part of its Object-Glaſs, if the Objects differ in Brightneſs. The ſecond Speculum may have a Part unfoil'd, that if either of them be ſufficiently luminous, the leſs bright may be ſeen through it by the whole Aperture. If the Sun be one of the Objects, or the Moon be compared with a ſmaller fix'd Star; their reflected Images muſt be ſtill farther weakened by the Interpoſition of one or more of the dark Glaſſes S T. An exact Poſition of the Teleſcope is not neceſſary; and the Inſtrument may be uſed without one, the Diſpoſition of the Specula, with regard to the Sector and Index, being ſuch as may allow the Eye to be brought as near the ſecond Speculum as may be, and make the Inſtrument the moſt commodious for the Obſerver.

It will be eaſy to judge, that ſcarce any greater Degree of Steadineſs is requiſite in the Pedeſtal, or Machine which carries this Inſtrument, than what is ſufficient for the Teleſcope us'd with it: For although the vibrating Motion of the Inſtrument may occaſion the Images of the Objects alſo to vibrate croſs one another; their apparent relative Motion will be very nearly in Lines parallel to *cf*; and it will not be difficult to diſtinguiſh whether they coincide in croſſing one another, or paſs at a Diſtance: And if the Objects are near one another, and the Teleſcope magnify but about four or five Times, it may be held in

the Hand without any ſtanding Support. In this Manner the Altitude of the Sun, Moon, or ſome of the brighter Stars from the viſible Horizon may be taken at Sea, when it is not too rough.

FIG. IV. ſhews an Inſtrument deſigned for this Purpoſe; differing from the foregoing Deſcription chiefly in the placing the Specula and Teleſcope, with regard to the Sector and Index; it has alſo a third Speculum N O diſpos'd according to the Directions when the Angle is greater than 90 Deg. whoſe Uſe is to obſerve the Sun's Altitude by Means of the oppoſite Part of the Horizon. In placing theſe two ſmaller Specula, it will be farther neceſſary to take care that the Speculum I K G H do not ſtand ſo as to intercept any of the Rays coming from the greater one fix'd on the Index to the third N O, nor either of them hinder the Index from coming Home to the End of the divided Arch. W Q is a Director for the Sight; which is neceſſary when the Teleſcope is not made uſe of. This conſiſts of a long narrow Piece, which ſlides on another fix'd on the back of the Octant, and carries at each End a Sight erected perpendicularly on it: It may be removed at Pleaſure, and exchanged for the Teleſcope, which ſlides on in the ſame manner, both ſerving indifferently with either of the two ſmaller Specula. The Eye is to be plac'd cloſe behind the Sight at W; and the Thread ſtretch'd acroſs the opening of the other Sight at Q perpendicular to the Inſtrument is to aſſiſt the Obſerver in holding it in a vertical Poſture, who is to keep this Thread as near as he can parallel to the Horizon, and the Object near the upright one. How far an Inſtrument of this

Kind

Kind may be of Uſe at Sea to take the Diſtance of the Moon's Limb from the Sun or a Star, in order to find the Ship's Longitude, when the Theory of that Planet is perfected, I leave to Trials to determine.

The Society have the Satisfaction of knowing that Theory to be already brought to a good Degree of Certainty and Exactneſs, thro' the conſummate Skill in Aſtronomy, and indefatigable Diligence in obſerving, of a very learned Member; and have great Reaſon to hope, that this uſeful and difficult Part of Aſtronomy will in a little time appear to be abſolutely compleated by the continued Labour and Application of ſome of their own Body.

II. *An Extract of a Diſſertation* De Stylis Veterum, & diverſis Chartarum generibus, [*by the Hon. Sir* John Clerk, *one of the Barons of the Exchequer in* Scotland, *and F. R. S.*] *By* Roger Gale, *Eſq; Vice-Preſident and Treaſurer R. S.*

THE learned and judicious Author takes occaſion from ſome antique Braſs Implements found near the Wall of *Antoninus Pius*, now named *Graham*'s *Dyke*, in *Scotland*, to give us this curious Diſſertation upon the *Stylus*, an Inſtrument uſed by the Ancients for Writing, with the Figures of ſome of them annex'd in a Copper Plate; two of which are repreſented in the Shape and Form of the Roman *Fibula*; but the Author is of Opinion they were deſigned for a different Purpoſe, for which he produces very cogent Reaſons.

He obſerves, that before the Uſe of Pens the Ancients performed their Writing with an Inſtrument call'd by them a *Stylus* or *Graphium*. The Matter of it was Gold, Silver, Braſs, Iron, or Bone; the Shape various, but alike in being pointed and ſharp at one End, and flat and broad at the other End: The firſt for writing, or rather cutting their Letters, the latter for defacing or rubbing out whatever wanted Correction; for all which, as well as for every thing elſe aſſerted by him, he produces ſufficient Proofs from proper Authors.

He informs us, that the *Styli* made of Iron, were ſometimes uſed as Daggers, and quotes two Paſſages out of *Suetonius* to prove it; one where *Julius Cæſar* is ſaid to have wounded *Caſſius* in the Arm, *Graphio*; the other, where he tells us it was cuſtomary with *Caligula* to get his Enemies murder'd, *Graphiis*, when they came into the Senate-Houſe, and confirms theſe two Paſſages by a third, taken from *Seneca*'s Firſt Book *De Clementia*. He ſuppoſes the *Stylus* made of Bone was for the Uſe of Women and Children, as leſs dangerous than thoſe of Metal; by a Quotation from *Prudentius*, it appears that *Caſſianus* the Martyr was kill'd by his Scholars with Iron *Styli*.

He agrees with *Petavius*, or his Editors, that the Implements, which gave Birth to this Diſſertation, were *Styli*, and not *Fibulæ ad connectendas veſtes*, as *Monfaucon* and other Antiquaries have imagined, and thinks an Objection that the Tongues of the *Styli* muſt have been much longer than the Tongues of their ſuppoſed *Fibulæ*, to be of little Weight; ſince there

there muſt have been ſome of them longer, and ſome of them ſhorter, according to the different Fancies of the Writers. Military Men might ſometimes write with the Point of their Daggers, and from this Practice the Words *Stylus* and *Pugio* came to be confounded; but Men of Buſineſs and private Perſons cannot be ſuppoſed to have made uſe of Daggers for Writing. He obſerves alſo, which is no ſmall Argument for his Side of the Queſtion, that if *Monfaucon* had conſulted the numerous Draughts he has publiſhed of the Habits belonging to the old *Greeks* and *Romans*, he would not have found one of theſe Implements, either as a Faſtening or an Ornament upon them.

He proceeds next to a Deſcription of theſe *Styli* found in *Scotland*, and ſhews how they were accommodated to the Buſineſs he ſuppoſes them deſigned for; but as the Copper Plate prefix'd to his Diſſertation will give us a much clearer Notion of that, I ſhall refer you to it, and only take notice that the fifth Figure in it is ſo intirely different from the others, that he himſelf is in ſome Doubt about it, and owns it might have ſerved the Aruſpices, in examining the Bowels of Animals, and have been one of thoſe Inſtruments called *Exſtiſpicia*. However, he thinks that if he ſhould pronounce it to have been a *Stylus*, he ſhould not be much out of the way, ſince the Ancients had their *Thecæ Graphiariæ*, which Name will agree very well with this Braſs Caſe, and the Inſtrument found within it. From the *Stylus* uſed to form Letters comes that figurative Expreſſion, that a Perſon writes ſuch or ſuch a ſort of a *Style*,

to

to denote his manner, as a *lofty Style*, or a *low Style*; which way of Speaking our own and other modern Nations have introduced into their Language.

As to the ſeveral Sorts of *Charta* uſed for writing, he obſerves the moſt ancient were made of Barks of Trees, or Skins, or were ſuch as are called *Pugillares*. The oldeſt were of the inner Bark of Trees called *Liber* in *Latin*, whence a Book had the Name of *Liber*; but very little of this Sort is now in Being, except the *Ægyptian* Paper may be accounted one Species of it.

The *Papyrus* was called Βύβλος or Βίβλος by the *Greeks*, and thence their Books Βίβλοι or Βίβλια. This Sort of *Charta* was made of a Plant that had many pelliceous Tunicles, as *Pliny* informs us, which were ſeparated from one another by a Needle, and then glued again together, to give them a Strength and Firmneſs ſufficient to retain what might be wrote upon them. *Alexandria* was the Place moſt eminent for this Manufacture. There are ſome Fragments of this Sort ſtill extant in Libraries, particularly the famous Manuſcript of St. *Mark*'s Goſpel at *Venice*.

The *Chartæ Membranaceæ* are made of the Skins of Animals, dreſſed either like our Glove-Leather, or modern Parchment. The firſt Sort was commonly uſed by the *Jews* for writing the Law of *Moſes* upon it, and from the rowling up of theſe Skins comes the Word *Volumen*. But the Skins which *Varro* and *Pliny* ſay were firſt made by *Eumenes* King of *Pergamus* were in more common Uſe: However, *Eumenes*, who is related by theſe Authors to have made them in Oppoſition to *Ptolomy* King of *Ægypt*, that had forbid the Exportation of the *Papyrus* from his Dominions,

minions, does not ſeem to be the Inventor of the *Chartæ Membranaceæ*, ſince *Herodotus*, who lived long before his Time, informs us, that the *Ionians* and other Nations were uſed to write upon Goat and Sheep-Skins. *Joſephus* alſo tell us, that the *Jews* ſent their Laws written upon Skins in Letters of Gold to *Ptolomy*; by which it ſeems as if the writing upon Skins was no new thing at that Time among the *Jews*.

The Uſe of the *Pugillares* was alſo very ancient, being mentioned by *Homer*, and among the *Latins* by *Plautus*. They were made of all Sorts of Wood, Ivory, and Skins covered over with Wax. They were likewiſe of ſeveral Colours, as red, yellow, green, ſaffron, white, and others. Being waxed over, any thing was eaſily wrote upon them by the Point of the *Stylus*, and as eaſily rubb'd out, and alter'd by the flat Part of it. Sometimes theſe *Pugillares* were made of Gold, Silver, Braſs, or Lead, and then there was a Neceſſity of an Iron *Stylus* to write or cut the Letters upon them, which explains that Paſſage in the 19th Chapter of *Job*, *Quis mihi det ut exarentur in libro, Stylo ferreo & plumbi lamina, vel celte ſculpantur in Silice.* They conſiſted ſometimes of two, three, five, or more Pages, and thence were called *Duplices*, *Triplices*, *Quintuplices*, and *Multiplices*; and by the *Greeks*, Διπλυχα, Τειπλυχα, &c.

The *Diptychs* and *Triptychs* that were covered with Wax, ſerved only for common Occurrences, the other Sorts received every thing elſe that was wrote upon *Chartæ* or *Membranæ*, and were ſometimes

called

called by the *Greeks Palimpseſtæ*, from the rubbing out of the Letters upon them.

The *Chartæ Linteæ*, and *Bombycinæ*, which were made of Linnen or Cotton, were of a much later Date; and from theſe we learned to make the Paper now in Uſe of Linnen Rags, an Invention probably of about 600 Years ſtanding.

Writing was practiſed upon all theſe *Chartæ* with a Reed, and afterwards with a Pen, except upon the *Pugillares*. Theſe Reeds grew upon the Banks of the *Nile*; the *Greeks* alſo uſed Reeds imported from *Perſia* for the ſame Purpoſe. *Calami argentei* are alſo mentioned for Writing.

Their Letters were formed with Liquors of various Colours, but chiefly black, thence called *Atramentum*, and in *Greek* μέλαν or μελάνιον. It was ſometimes made of the Blood of the *Cuttle* Fiſh, ſometimes of Soot. *Apelles* compoſed a *Black* of burnt Ivory, which was called *Elephantinum*. They had Ink alſo from *India* of an approved Compoſition, as *Pliny* ſays.

The Titles of their Chapters and Sections were wrote in Red, or Purple: Hence the Titles of the *Roman* Laws are called *Rubricæ*. Their *Purpura* was an exceeding bright Red, or Crimſon, much in Vogue with the *Byzantine* Writers, and called Κιννάβαεις, which was a Liquor made of the *Murex* boiled, and its Shell very finely powdered; or as *Pliny* relates, of the Blood of that Fiſh. Almoſt all the ancient Emperors wore this Colour, their Names were painted in it upon their Banners, and they frequently wrote with it, and wore it. This Colour was often the Diſtinction of a *Roman* Magiſtrate,

ſtrate, and to put on the Purple was the ſame thing as to aſſume the Government. This Colour was ſo admired by the Poets, that they called every thing which was very bright and fine, Purple; as *Horace* complements the Swan, which is never of any Colour but white, with

Purpureis ales oloribus.

We find even *Snow* honoured with the ſame Epithet, whence ſome have imagined that *purpureas* ſignify'd *white.*

The Children of the Emperors, and ſuch as had a Proſpect of riſing to the Throne, and their Guardians, ſometimes wrote with Green; Gold alſo was employed for the like Purpoſe. They that deſire to ſee more upon this Subject may have Recourſe to *Mabillon De Re Diplomatica*, and *Monfaucon* in his *Palæographia Græca.*

III. *Some Experiments concerning the* poiſonous Quality *of the* Simple Water *diſtilled from the* LAURO-CERASUS, *or* common Laurel, *made upon Dogs, at* Toppingo-Hall *in* Eſſex, Auguſt *the* 24*th* 1731. *and others made before the* ROYAL SOCIETY *in their Repoſitory. By* Cromwell Mortimer, *M. D. R. S. Secret.*

I Took a Peck of Laurel Leaves, and put them into an Alembick with three Gallons of Water, which

I diſtilled in the common Way, as *Penny Royal, Mint Water*, or any Simple Waters are made. The Fire at firſt being too hot, there came over an Oilineſs with the Water, (1.) which made it appear milky, till about half a Pint had run: This taſted and ſmelt very ſtrong like Apricock Kernels, as did the next Running, (2.), which was clearer. I kept the firſt Quart of it by itſelf; then I drew off another Quart, (3.) which was not near ſo ſtrong in Taſte or Smell, but rather reſembled *Black-Cherry Water*: The Remainder was almoſt inſipid. The Leaves after the Diſtillation look'd browniſh, were brittle, and taſted bitter without the Roughneſs or Apricock-Kernel Flavour, which they have while freſh.

In the Afternoon of the ſame Day I took a Mungrel Puppy, weighing two Pounds and an half, about ſixteen Days old; it had ſuck'd the Bitch in the Forenoon, but had now faſted ſix Hours. I took one Ounce of the third Water, and gave ſome of it to the Puppy, gradually by Tea-Spoonfuls, that it might the better ſwallow it. When it had taken half the Quantity, I let it go; it walk'd about pretty ſtrongly for five Minutes, when it began to foam at the Mouth, and ſoon after vomited up ſome curdled Milk, and then diſcharged the *Fæces alvinæ*, after which the Sickneſs ſeemed to go off: I then gave it three Tea-Spoonfuls more; in ten Minutes it began to ſtagger, and draw its hind Parts after it; it ſat upon its Breech, whined, and made ſeveral Efforts to vomit, but never brought any thing up; and then again would walk about, and ſit down and whine, and again ſeem to recover for about fifteen Minutes longer: Then thinking the ſecond Water would

would dispatch it sooner out of its Misery, it seeming to be very uneasy, I took one Ounce and half of the second Running: I gave it first three Tea Spoonfuls, and set it down, when in two Minutes time it became strongly convulsed, put out the Tongue, and made strong Efforts to vomit, but to no Effect; it could not stand on its Legs, but lay with its hind Legs stretched out: Five Minutes after I gave three Tea Spoonfuls more, when it was stronger convulsed, rolled over and over several times, drew its Head back to its Rump, then lay on its Side and panted much: About eight Minutes after, I gave it two Tea Spoonfuls more, and it had fresh and strong Convulsions, but kept lying on its Side, and thus stretching out its four Legs one after another, drawing in its Flanks very quick; in fifteen Minutes more it died, being in all about an Hour from the first Dose.

An Hour after it was dead I opened it, and found all the Contents of the *Abdomen* well; the Stomach was distended with Wind, being opened, it appeared empty of Milk, but full of Froth, and a clear *Mucus* of a much thicker Consistence than the *Liquor Gastricus* naturally is; they had no Smell at all, the inside of the Stomach was not at all inflamed.

On opening the *Thorax* I found the Lungs a little redder than natural, with some Vessels on the outward Membrane of them very turgid: On cutting them out a pretty deal of clear red Blood ran from them. The Veins and both Ventricles of the Heart were turgid and full of coagulated Blood, of a dark-brown Colour, which tinged my Fingers of a dirty yellow, as if some Gall had been mix'd with it.

There was no Blood in the Arteries; the *Foramen Ovale* was open.

On opening the Head, the *Dura Mater* appeared livid, as if bruiſed, its Veſſels and the *Sinus falci-formis* were turgid and full of the ſame Blood, as the Heart and Veſſels near it. The cortical Subſtance of the Brain looked of an unuſual livid blueiſh Colour.

Next Day about Five in the Afternoon I took a large Maſtiff Dog weighing ſeventy-five Pounds. We tied him to a Poſt as he ſtood on his Legs, one holding him ſtrongly by the Tail, he being very fierce and unmanageable: We injected *per Anum* three Ounces of the ſecond Running; in five Minutes he trembled and ſtagger'd much, would let us handle him, he drew his hind Legs after him, tumbled on his Head, panted and ſlabber'd, but gradually recover'd ſo as to ſtand up, tho' reeling and often ſinking with his hind Legs. Fifteen Minutes after, we injected one Ounce more; he immediately ſtagger'd and ſunk behind, ſoon after he made Water plentifully. We then led him to another Kennel, where he ſoon diſcharged the *Fæces alvinæ* plentifully, but of an hard Conſiſtence: The *Fæces* ſeem'd moiſten'd with the laſt injected Ounce, which I imagin'd came away by this Stool; I therefore immediately injected another Ounce, upon which he ſeemed more uneaſy than before, tumbling on one Side, and in about ten Minutes after, he fell faſt aſleep, breathing with Difficulty; half an Hour after, I rouzed him, found him ſlabbering, drowzy, ſinking behind, and giddy: About an Hour and a Quarter after the firſt Injection, I found him as before, but provoking him with a Stick, he bit at it,

and

and tho' naturally fierce, he was very quiet when I did not ſtrike him; in a few Minutes he reeled and fell a ſnoaring again: About Nine at Night he ſeemed very well, only drowſy. We left him all that Night without Water and Victuals; but thro' Hunger he eat ſome of the Straw he lay on, as we found afterwards upon opening his Stomach. Next Morning, being *Friday*, we gave him Water and Bones; he drank greedily, and eat the Bones, Bread, and whatever was given him, ſeeming perfectly recover'd and well all Day and the next Night, only very thirſty, and a little drowzy, but perfectly gentle.

On *Saturday*, about Nine o'clock in the Forenoon, we faſten'd him to a Poſt, and put a Rope into his Mouth, by which his Noſe was ty'd faſt to a Rail, great Care being taken that there ſhould be no Rope about his Neck ſo tight, as to hinder his ſwallowing or his breathing: I then gave him three Ounces of the ſecond Running, at three times, with an Horn, ſuch as they drench Horſes with; he ſwallowed it with great Difficulty, and guggled ſome up again: To prevent which, I thruſt the Horn a good way down his Throat. We then unty'd him from the Poſt, to ſee how he could walk, but he inſtantly reeled, fell down, rolled over and over, diſcharg'd much Urine, and ſome hard *Fæces alvinæ*, had no Motion to vomit, but dribbled much, panted, and ſhewed great Difficulty of breathing, ſnuffing up the Air with his Noſtrils, holding his Noſe up, as he ſat on his Breech; for he could not then ſtand on his hind Legs: He often ſhook his Head, as if ſtung by ſome Fly: He gradually recover'd, and in about twenty Minutes time could walk

walk about very ſteadily on all his Legs, tho' he ſtill appear'd weakeſt behind: Wherefore imagining he might linger a long time, or perhaps recover entirely, we made him faſt again, and gave him three Ounces more, near half of which he ſpilt; and indeed out of the ſix Ounces, I don't believe above three or four enter'd his Stomach: He gave one terrible loud Howl, and ſunk down at once, before we could untie him from the Poſt, to ſee whether he could walk or not. He never offer'd to riſe again, but lay on one Side, panted, hung his Tongue out, and ſlabber'd much, ſtretch'd all four Legs out three or four times, and was quite dead and motionleſs in about five Minutes time. I did not obſerve any Convulſion in the Muſcles of the Neck and Back, nor was his Head and Tail drawn nearer together, as in the Puppy.

About half an Hour after I open'd him, being ſtill warm. I found the Bladder contracted and empty; the *Rectum* ſlightly inflamed, the ſmall Guts not diſtended with Wind, but contracted, and almoſt cloſe; the Bile was evacuated in a great Quantity into the *Duodenum*, and was very thick, appearing like congealed Honey; the Gall-bladder was almoſt empty; but what remained in it was as thick as the other; to the Inſide of the Gall-bladder there adhered ſeveral Excreſcencies in Form and Size of Lentils, like Drops of ſoftiſh yellow Wax: The Liver was exceedingly inflamed, and almoſt livid: The Stomach was contracted near the *Pylorus*, and again about three Inches above it; upon opening it, we found ſome pieces of Bone in it, a pretty deal of Straw, and about two Ounces of Fluid, which ſmelt ſtrong of the

Laurel

Laurel Water; but no *Mucus*, as in the Puppy: Some of the *Villi* ſeemed ſlightly inflamed, the Blood Veſſels being very turgid: There was a great deal of *Mucus* in the *Oeſophagus*, which did not ſeem inflamed. On opening the *Thorax*, the Lungs appear'd exceedingly contracted, and very red. and inflamed. In this Dog it was very evident, that the *Pericardium* did not adhere to the *Diaphragm* as in erect Animals, here being a Diſtance of above two Inches, which was fill'd up by an *Appendix* to the right Lung; on removing which the *Vena cava* run from the *Diaphragm* about three Inches to the *Pericardium* quite free, not adhering to the Back by any Fibres or Membranes, and was entirely envelop'd by this Appendix of the Lung. The *Vena cava* and all the Veins were vaſtly diſtended, and the Blood in them coagulated, tho' the Body was yet hot: There was little or no Blood in the *Aorta*; only on preſſing it, a ſmall Quantity of a tranſparent Fluid, which I took for *Serum*, flowed out of it. The Blood was ſtrongly coagulated in the right Auricle and Ventricle of the Heart, being of a very dark Colour, and fill'd them quite; but the left Auricle and Ventricle contained only a ſmall Clot of congealed Blood, which look'd more red and florid: I kept ſome Clots of the Blood out of the Vein, and alſo out of the left Ventricle, twenty-four Hours, but neither of them liquified or run into *Serum*. I had the Head cut off, but Buſineſs preventing, I did not open it till twenty-four Hours after; a great deal of Blood drained from it, and upon opening it, the Veſſels did not then appear diſtended, but the *Dura Mater* look'd livid;

livid: There was no Blood at all in the *Sinus falciformis*; the Brain look'd very well; the Veſſels of the *Plexus Choroides* in each Ventricle were not diſtended, but livid, nor were they burſt, there being no Extravaſation in the Ventricles, only a very ſmall Quantity of Lymph; which was the Caſe likewiſe of the *Pericardium*, which had not above a Tea Spoonful of Water in it.

In both theſe Inſtances this Poiſon ſeems to act by coagulating the Blood; ſo that it can't paſs the Lungs or Brain: And I take it that the Puppy liv'd longer than the great Dog; becauſe in the Puppy the *Foramen Ovale* was open, by which the thicken'd Blood could paſs, and perform a few Circulations more than it could have done, had it had the Lungs to paſs thro'; and that in the Puppy the Brain was the Part the moſt affected, as was evident from the Convulſions it had: Whereas the Dog was little convulſed, but ſeem'd to die of a Difficulty of Breathing; and the greateſt Accumulation was found at the right Ventricle of the Heart.

When I return'd to *London*, I got a middling-ſiz'd Spaniel, on whom I tried the Experiment at the Houſe of our Honourable Preſident. I pour'd about three Ounces of the Laurel Water into an old Coffee-Pot, and while the Dog was held faſt by another, ſome Laurel Water was poured down his Throat: He ſtruggled pretty much at firſt, and whined; but when about half of it was down, he ceaſed ſtruggling; that he might not be too long a dying, the Remainder was given him; he ſpilt about one third of the whole Quantity: He was then laid down on the Ground,

but

but never offer'd to get up, only ſtretching out his Legs, expir'd preſently. Mr. *Ranby*, who aſſiſted at the Experiment, open'd him immediately; there was about two Ounces of the Laurel Water found in his Stomach, and ſome frothy *Mucus*; the Veins in general were very turgid, but the Blood was ſtill fluid; and indeed we could diſcern no Alteration in any of the *Viſcera*.

I gave four Ounces of *Laurel Water* to Dr. *Porter*, *Coll. Med. Lond. Licentiat*. He forc'd down a pretty large Dog three Ounces, with no great Difficulty. The Creature inſtantly returned about two Ounces by Vomit, clear and unalter'd; in a few Minutes he grew prodigiouſly convulſed, ſoon after became motionleſs, and to all appearance was dying. Within ten Minutes he vomited a ſecond time, and threw up a ſmall Quantity of a viſcid, green, and very frothy Matter: From which Moment he began to recover, and within half an Hour was perfectly well. He was kept in the Yard all Night, and the next Morning not the leaſt Diſorder being to be perceived in him, he was turned out of Doors.

An Account of the Experiment tried upon a Dog with Laurel Water, *in the Preſence of ſeveral Members of the* Royal Society, *in their Repoſitory, upon* Thurſday *the 28th of* October 1731. *By* Cromwell Mortimer, *R. S. Secr.*

ABout half an Hour after Six in the Evening I gave about half an Ounce of the *Laurel Water* to a middle-ſiz'd Spaniel weighing near ſixteen Pound, which he ſwallowed with great Reluctance, ſpilling

near as much more, which I endeavour'd to pour down his Throat. Some of the Company desired he might be set down, to see what Effect so small a Quantity would produce: He remained about a Minute and half on his Legs; he then began to reel, and in about three Minutes more fell into most violent Convulsions, and his Neck and Tail were strongly drawn toward each other; he neither vomited nor purged, but we expected he would expire every Minute, the Convulsions being so exceedingly strong, when some of the Company call'd for some Milk, in order to try whether it would prove an Antidote to so *desperate a Poison*. We poured a little Milk into his Throat, which at first he could not swallow, but guggled it up again as if almost strangled with it. After several Trials he began to swallow some, about a spoonful at a time, and seemed a little relieved, his Convulsions leaving him, only fetching his Breath very hard; but he lay still and snorted, as if in a profound Sleep; and the Milk frothed out of his Nose: On rouzing him, he opened his Eyes, and swallowed the Milk better, which seemed to revive him much; so that the Company imagining he would entirely recover, went away. I staid some time longer, till at last he began to lap the Milk himself when held up to it: He vomited up a pretty deal of Milk, which relieved him more; and then he lapped again, but could not stand on his Legs. I left him in this Condition about seven o'Clock, thinking he would have recovered, and left Orders that he should have a Pan of Milk, and another of Water, about a Pint of each, set by him, and that he should be kept shut up all Night.

About

About eleven o'Clock he was ſeen alive and walking about; but next Morning he was found dead, after having drank up all the Milk and Water, and having vomited and purged pretty much.

Thus we find this ſimple Water diſtilled from a Vegetable, equally mortal with the Bite of the Rattle-Snake, and more quick in its Operation than any Mineral Poiſon; and tho' it may not immediately bring on Death, when taken in ſmall Quantities, or mixed with other Liquors, it being common among our good Houſewives to put Laurel Leaves into Cream to give it the Rattafia or Apricock-Kernel Flavour; and ſome Compounders of Cordial Waters, to uſe the Berries of this Plant in Brandy inſtead of Black Cherries, to mix ſome of the diſtilled poiſonous Water with Brandy to make Rattafia, or to dilute it with common Water, till it reſembles Black-Cherry Water in Taſte; tho one ſingle Draught at a time may not prove immediately mortal, yet an habitual Uſe of theſe Liquors muſt certainly be exceeding prejudicial and unwholeſome, and in weakly Perſons muſt haſten Death.

I am informed that a Gentleman and his Wife, who uſed for ſeveral Years to drink daily a Dram or two of the Brandy in which Laurel Berries were infus'd, both died paralytic, having loſt their Speech ſome time before.

IV. *A Continuation of an Account of Mr.* Mark Catesby's *Eſſay towards a Natural Hiſtory of* Carolina *and the* Bahama *Iſlands, with ſome Extracts out of the fourth Set, by Dr.* Mortimer, *R. S. Secret.*

I Gave an Account of the Contents of the three firſt Sets of this curious and pompous Performance in the 415th Number of theſe Tranſactions, from *Page* 425. to 434. I now proceed to the fourth Set, beginning with Plate

61. *Parus Americanus Luteſcens.* The Pine-creeper.

Liguſtrum Lauri folio, fructu violaceo. The purple-berried Bay.

62. *Parus Americanus gutture luteo.* The yellow-throated Creeper.

Acer Virginianum, folio majore, ſubtus argenteo, ſuprà viridi ſplendente. Pluk. Almag. the red flowering Maple (†). It bears our *Engliſh* Climate.

63. *Parus Carolinenſis Luteus.* The yellow Titmouſe.

Laurus Carolinenſis, foliis acuminatis, baccis cæruleis, pediculis longis rubris inſidentibus. The red Bay. The Wood of this Tree is moſt beautiful for Cabinets.

64. *Parus Fringillaris.* The Finch-creeper.

Frutex Padi foliis non ſerratis, floribus monopetalis albis campani-formibus, fructu craſſo tetragono.

65. *Mellivora Avis Carolinenſis.* The Humming Bird. This Bird ſubſiſts by ſucking the Honey out Flowers in the manner of Bees. *Big-*

Bignonia Fraxini foliis, coccineo flore minore. The Trumpet-Flower.

66. *Muſcicapa vertice nigro.* The Cat-Bird.

Alni-folia Americana ſerrata, floribus pentapetalis albis, in ſpicam diſpoſitis. Pluk. Phyt. Tab. 115. Fig. 1. (†).

67. *Ruticilla Americana.* The Redſtart.

Nux Inglans nigra Virginienſis. Park. 1414. The Black Walnut, The Wood of this Tree is very near black, and is very handſome in Cabinets, *&c.*

68. *Rubicilla minor nigra.* The little black Bulfinch. This Bird is likewiſe an Inhabitant of *Mexico*, where by the *Spaniards* it is called *Mariposa nigra*, or the black Butterfly.

Amelanchier Virginiana, Lauro-ceraſi folio. Hort. Sicc. Petiver. Raij Suppl. App. 241. *Arbor Zeylanica, Cotini foliis, ſubtus lanugine villoſis, floribus albis, cuculi modo laciniatis.* Pluk. Alm. p. 44. Tab. 241. Fig. 4.

69. *Iſpida.* The King-Fiſher.

Myrtus Brabanticæ ſimilis Carolinenſis, baccata, fructu racemoſo ſeſſili monopyreno. Pluk. Almag. The narrow-leav'd Candle-berry Myrtle. Another Species is deſcribed before in p. 13. The Berries of this Plant boiled in Water afford an Oil, which being skimmed off, is hard like Wax, when cold, and of a green Colour: This they clarify, and by mixing one fourth Part of Tallow with it, make good Candles of it.

70. *Gallinula Americana.* The Soreè. This Bird is in *Virginia* as much in Requeſt for the Delicacy of its Fleſh, as the *Ortulan* in *Europe*.

Gentiana Virginiana, Saponariæ folio, flore cæruleo longiore. Hiſt. Oxon. III. 184. Ico. Tab. 5. § 12.

71. *Pluvialis vociferus.* The Chattering Plover. In *Virginia* they are called *Kildeers*, from ſome Reſemblance of their Noiſe to the Sound of that Word.

Frutex foliis oblongis acuminatis, floribus ſpicatis uno verſu diſpoſitis. The Sorrel Tree.

72. *Morinellus Marinus* of Sir *Thomas Brown.* An *Cinclus Turneri?* Willoughby, p. 311.

The *Turn-Stone* or *Sea-Dottrel.* This Bird has its Name from its Practice of turning up Stones of two or three Pound-weight, in order to find Inſects and Worms under them. It is a Native both of *England* and *America.*

Arbor maritima, foliis conjugatis Pyri-formibus apice in ſummitate inſtructis, floribus racemoſis luteis.

73. *Phœnicopterus Bahamenſis.* The Flamingo.

Theſe Birds will not fly away at the Report of a Gun, and when one is killed, all the reſt ſtand about him, gazing on; ſo that one may kill ſeveral one after another.

Keratophyton dichotomum fuſcum.

74. *Caput Phœnicopteri naturalis magnitudinis.* The Head of the *Flamingo* in its full Dimenſions.

Our Author ſays, that when they feed, they bend down their Necks, ſo that they lay the upper part of their Bills next the Ground, and that they get a round ſort of Grain like Millet out of the Mud, as he hath been informed, and that it is doubted whether they prey on Fiſh and Eels, as hath been thought. Dr. *James Douglas* hath given an ample

ample and curious Deſcription of this Bird, in *Tranſ-act.* N° 350.

Keratophyton fruticis ſpecie, nigrum.

75. *Grus Americana alba.* The Hooping Crane.

Prunus Buxi folio cordato, fructu nigro rotundo. The Bullet-Buſh.

76. *Ardæa cærulea.* The blue Heron.

77. *Ardæa alba minor Carolinenſis.* The little white Heron.

Ketmia fruteſcens glauca, Aceris majoris folio longiore ſerrato, flore carneo.

78. *Ardea Stellaris Americana.* The brown Bittern.

79. *Ardea Stellaris Criſtata Americana.* The Creſted Bittern. They breed in the *Bahama* Iſlands, where the young ones, tho' almoſt full grown, will ſuffer themſelves to be taken by Hand. They are reckon'd good Meat. They are there called *Crab-Catchers*, becauſe they moſtly ſubſiſt on Crabs.

Lobelia fruteſcens, Portulacæ folio. Plumier. Nov. Gen. p. 21.

80. *Ardea Stellaris minima.* The ſmall Bittern.

Fraxinus Carolinenſis, foliis anguſtioribus utrinque acuminatis, pendulis. The pointed-leaved Aſh of *Carolina*.

The Plants mark'd (†) are ſuch as the Author hath raiſed himſelf in the late Mr. *Fairchild*'s, now Mr. *Bacon*'s Garden at *Hoxton*, and which he hath found by Experience to bear our Climate in Winter without any Shelter.

As

As I omitted in my Account of the three former Sets, to put this Mark to ſuch Plants as were growing at *Hoxton*, I ſhall here only mention their *Engliſh* Names, and the Numbers of the Pages in which they are deſcribed; which are,

In the firſt Set.

Pages 16 to 23. being ſeveral Kinds of Oaks.

In the ſecond Set.

Page 27 The Dogwood Tree.
38 The Hiccory and the Pignut.
39 The ſweet flowering Bay.

In the third Set.

Page 48 The Tulip Tree.
49 The Catalpa Tree.
53 Yellow Jeſſamy.
55 Saſſafras.
57 The upright Honeyſuckle.

In this fourth Set.

Page 62 The red flowering Maple.
66 *Alni-folia*, *&c.* which hath no *Engliſh* Name.

Numb. 421.

PHILOSOPHICAL TRANSACTIONS

For the Months of *October*, *November* and *December*, 1731.

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II. *An Account of the* Contrayerva, *by Mr.* William Houſtoun, *Surgeon in the Service of the Honourable* South-Sea *Company.*

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IV. *Viri Celeberrimi* Johannis *Marchionis* Poleni, *R. S. S. ad virum Doctiſſimum* Jacobum Jurinum, *M. D. R. S. S.* Epiſtola, *qua continetur* Summarium Obſervationum Mete-

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V. *An Account of a Book entitled,* J. P. Breynij, *M. D. F. R. S. &c.* Hiſtoria Naturalis Cocci Radicum Tinctorij, quod Polonicum vulgò audit. 4^to^ Gedani, 1731. Cum Figuris. *By* Richard-Middleton Maſſey, *M. D. F. R. S. and Honorary Fellow of the College of Phyſicians.*

VI. *A* Botanical Invitation *to forward an Hiſtory of the Plants of* Swiſſerland; *by Dr.* John Jacob Scheuchzer, *M. D. F. R. S. ſent to Sir* Hans Sloane, *Bar^t^. Pr. R. S. to be communicated to the* Royal Society: *Tranſlated by Mr.* Zollman, *F. R. S.*

VII. *An Account of what appeared moſt remarkable on opening the Body of* Ann Edwards, *who died* January 5*th*, $17\frac{29}{30}$, *having a large* Umbelical Rupture. *Communicated to the* Society *by* John Ranby, *Eſq; Surgeon to his Majeſty's Houſhold, and F. R. S.*

Jos: Banks

V. *Obſervatio Eclipſis* Solis *die* 15 Julij 1730. *habita Pekini in publico ejus Regiæ Obſervatorio à* P P. Ignatio Kegler, & Andrea Pereyra *Societatis* JESU, *communicata per* Jacobum de Caſtro Sarmento, *M. D. Coll. Med. Lond. Lic. & R. S. S.*

EO die cœlum a ſummo manè densè obnubilatum, ac poſtea in pluvias reſolutum, copioſos imbres dejecit proxima ante Eclipſim hora; ita ut Eclipſim alij quidem obſervari poſſe pene jam deſperarent, alij verò non apparituram ſibi gratularentur: cum ex inſperatò ſub ipſum Eclipſis initium ſiſtere pluviæ, ſimulque nubes rareſcere cœperunt, ac poſt horæ quadrantem per rariora nubila nudis oculis ſpectabile apparere corpus *Solis*, ſupernè ex parte borea non nihil ad dextram ſeu occidentem verſus Eclipſi infectum circiter ſeſquidigitum. Igitur purgata è veſtigio areâ, & madore utcunque abſterſo exprompſimus, quod pro obſervatione coram ſpectatoribus multis commonſtranda præparaveramus organon, ad ſpeciem *Solis* ſcilicet per teleſcopium 6 pedum Sinicorum excipiendam in orthogonaliter ſubjecta menſula è cujus centro ad amplitudinem apparentis ſpeciei accuratè deſcriptus erat circulus per 10 digitos more Sinico diviſus. Parati quoque habebantur in charta munda plures circuli ſimiliter diviſi, & ſuper illum ſucceſſive applicandi, in quibus præſignatæ erant phaſes eclipticæ per ſingulos digitos apparituræ, ſecundum inclinationes *Lunæ* ad lineam verticalem *Solis*. Interim verò dum *Sol* tenues nubes penitus evinceret, clareque diſtinctam in diſco ſpeciem redderet, aliud ad *Solem* dirigebatur teleſcopium 2 len-

bus objectivis instructum, in ea inter se distantia, ut filare reticulum in foco telescopij dispositum, pariterque per 10 digitos divisum exacte quadraret apparenti magnitudini *Solis*, atque per istud primo observatus fuit appulsus *Lunæ*.

H.	′			
11	40	a. m. ad dig. III. id est Europ. dig.	3	36
11	51	ad dig. IV.	4	48

Postea clarissime allucente *Sole* per hujus speciem in disco notati fuerunt ut sequitur.

H.	′			
0	2	p. m. ad centrum seu d. V. Europ. d.	6	0
0	14	ad dig. VI.	7	12
0	26 ½	ad dig. VII.	8	24
0	40	ad dig. VIII.	9	36
0	51	max. Eclips. dig. VIII. ¼	9	54
1	2	regress. ad dig. VIII.	9	36
1	16	20″. ad dig. VII.	8	24
1	27	50 ad dig. VI.	7	12

Dein rursus tenui nebula involutus *Sol* suam speciem infuscavit, telescopio tamen præfato clare visibilis ad cujus reticulum observatus est.

H.	′			
1	39	p. m. recess. ad dig. V. seu cent.	6	0
1	50	ad dig. IV.	4	48
2	0	ad dig. III.	3	36

Iterum emergens è nebula *Sol* clarissimam exhibuit speciem ad quam porro notati sunt.

H.	′	″			
2	9	20	recess. ad dig. II.	2	24
2	18	20	ad dig. I.	1	12
2	27	10	Finis Eclipsis: qui itidem per aliud tele-		

teleſcopium excellens 14 pedum Sinicorum eodem momento eſt annotatus.

Horologium denique correxit, atque direxit *Sol* ipſe tum in magno ſciatherico, armillaque æquatoria Obſervatorij ſingula minuta horaria commonſtrans, tum per captas aliquot altitudines eadem momenta temporis comprobans.

Præterea aliquot *Solis* macularum occultationes & retectiones obſervatæ ſunt. Macula major, quæ erat in ipſa peripheria dig. II. ad *Nord-Oſt*, immerſa eſt h. o 22′ p. m. ſequentes aliæ minores ibidem inter dig. II. & I. immerſæ ſunt 1ª h. o 27′ 50″; 2ª h. o 31′ 40″: 3ª h. o 37′ 10″; 4ª h. o 38′ 35″. Maculæ 2 inter dig. III. & IV. verſus *Sud-Weſt* retectæ ſunt una h. 1 18′ 45″; altera h. 1 23′ 50″ quarum immerſiones non ſunt annotatæ. Maculæ 4 ad *Nord-Oſt* retectæ fuerunt. 1ª h. 2 5′ 20″; 2ª h. 2 7′ 30″; 3ª h. 2 11′ 25″; 4ª h. 2 12′ 25″.

Vide Typum Eclipſis Fig. V. Tab. Secundæ.

Immerſiones, atque Emerſiones Satellitum Jovis *Obſervatæ Pekini à* P P. Ignatio Kegler, & Andrea Pereyra *Soc. JESU a menſe* Dec. 1729.

SATELLES I.

			d.	h.	′	″	
1729	Immerſiones.	*Dec.*	01	04	56	00	a. m.
			08	06	45	47	a. m.
			10	01	14	30	a. m. dub.
			17	03	04	05	a. m.
			18	09	32	10	p. m.
			25	11	22	15	p. m.
			31	06	44	06	a. m.
1730		*Jan.*	02	01	12	26	a. m.
			09	03	03	45	a. m.
			10	09	31	00	p. m.
			17	11	22	30	p. m.
			25	03	33	30	a. m.
	Emerſiones.	*Febr.*	02	11	54	15	p. m.
			10	01	48	00	a. m.
			17	03	44	20	a. m.
			18	10	11	40	p. m.
			26	00	07	45	a. m.
			27	06	36	40	p. m.
		Mart.	06	08	32	30	p. m.
			13	10	29	00	p. m.
			21	00	25	50	a. m.
			29	08	53	26	p. m.
		Apr.	05	10	49	55	p. m.
		Maij	14	09	28	45	p. m.
		Jun.	22	07	55	30	p. m. dub.
Immer.		*Nov.*	04	06	00	00	a. m.

SA-

SATELLES II.

			d.	h.	′	″		
1729	Im.	*Dec.*	27	01	41	30	a. m.	
1730		*Jan.*	03	04	10	45	a. m.	
			12	07	57	15	p. m.	
	Emerſiones.	*Febr.*	07	07	47	27	p. m.	
			22	00	58	50	a. m.	
		Mart.	01	03	36	20	a. m. dub.	I
			11	07	33	15	p. m.	
			18	10	13	36	p. m.	
			26	00	51	45	a. m.	
		Apr.	12	07	30	48	p. m.	
		Maij.	21	10	06	50	p. m.	

SATELLES III.

			d.	h.	′	″		
1729	Immerſ.	*Dec.*	06	01	14	00	a. m. dub.	
			13	05	08	00	a. m.	
1730		*Jan.*	10	08	46	30	p. m.	
			18	00	42	00	a. m.	
	Emerſ.	*Febr.*	15	08	06	50	p. m.	
			23	00	05	06	a. m.	
		Mart.	30	08	14	46	p. m.	
		Apr.	06	08	41	00	p. m.	
		Maij	12	08	22	00	p. m.	

SATELLES IV.

			d.	h.	′	″		
1729	Im.	*Dec.*	01.	01	12	40	a. m.	
	Emerſ.			05	48	00	a. m.	
1730	Em.	*Febr.*	06.	05	38	00	a. m.	dub.
	Immerſ.		22.	06	45	15	p. m.	
	Emerſ.			11	30	00	p. m.	

VI. *Part of a Letter from* Tho Short, *M. D. to Sir* Hans Sloane, *Bart. Pr. R. S. concerning an extraordinary* Impostumation *of the* Liver.

Honoured Sir, *Sheffield,* June 11. 1731.

******I Had a Patient, who died lately of an *Impostumation* of the *Liver*; I open'd him, and out of the lowest and thinnest *Lobes* I took six Quarts of purulent, thick, most intolerably fetid, reddish-brown Matter, very acid; for no sooner was it exposed a little to the open Air, than it fermented exceedingly. The Patient had drained off the thinner Part the last Week of his Life by violent Vomiting; and purging to thirty or forty Stools a Day, and as many Vomits, it was thrown into the *Duodenum* by the *Ductus Cholidochus communis*, and there pumped up and thrown out, both by its Sharpness and Stimulation. All the upper Part of the Liver to about an Inch below the Gall-bladder was sound. The Tumour had so compressed the right Kidney, that it was emaciated away to less than the *Glandula Renalis*. *** From,

SIR,

Your most obliged humble Servant,

THO. SHORT.

ERRATA.

Numb. 417. Page 38. l. 14. for p. 21, 22. read p. 19.

I. *A Propoſal of a Method for finding the* Longitude *at* Sea *within a Degree, or twenty Leagues. By* Dr. Edmund Halley, Aſtr. Reg. *Vice-Preſident of the* Royal Society. *With an Account of the Progreſs he hath made therein, by a continued Series of accurate* Obſervations *of the* Moon, *taken by himſelf at the* Royal Obſervatory *at* Greenwich.

IT is now above twenty Years ſince I added an *Appendix* to the ſecond Edition of *Mr. Street*'s *Caroline Tables*, containing a Set of Obſervations I had made in the Years 1683 and 1684, for aſcertaining the Moon's Motion; and giving a *Specimen* of what I thought, at that Time, might be the only practicable Method of attaining the *Longitude* at *Sea*. What I printed ſo long ago, is as follows: "

" The Advantages of the Art of finding the " Longitude at Sea, are too evident to need any Ar- " guments to prove them. And having by my own " Experience found the Impracticability of all other " Methods propoſed for that Purpoſe, but that deri- " ved from a perfect Knowledge of the *Moon's Moti-* " *on*; I was ambitious, if poſſible, to overcome the " Difficulties that attend the Diſcovery thereof.

" And firſt, I had found it only needed a little " Practice to be able to manage a five or ſix Foot Te- " leſcope, capable of ſhewing the Appulſes or Occulta- " tions of the *Fix'd Stars* by the *Moon*, on Ship- " board, in moderate Weather; eſpecially in the Firſt

" and Laſt *Quarters* of the *Moon's Age*, when her
" weaker Light does not ſo much efface that of the
" *Stars*. Whereas the Eclipſes of the *Satellites* of
" *Jupiter*, how proper ſoever for *Geographical*
" Purpoſes, were abſolutely unfit at Sea, as requi-
" ring Teleſcopes of a greater Length than can well
" be directed in the rolling Motion of a Ship in
" the Ocean.

" Now the Motion of the Moon being ſo ſwift,
" as to afford us ſcarce ever leſs than two Minutes for
" each Degree of Longitude, and ſometimes two
" and a half; it is evident, that were we able per-
" fectly to predict the true Time of the Appulſe or
" Occultation of a Fix'd Star, in any known Meridi-
" an, we might, by comparing therewith the Time ob-
" ſerved on Board a Ship at Sea, conclude ſafely how
" much the Ship is to the Eaſtward or Weſtward of the
" *Meridian* of our *Calculus*.

" But after much Examination, and carefully col-
" lating the *Caroline Tables of Mr. T. Street* (though
" generally better than thoſe that went before him)
" as likewiſe thoſe of *Tycho*, *Kepler*, *Bullialdus*, and
" our *Horrox*, with many accurate Obſervations of
" the *Moon*, carefully made on Land; it does not ap-
" pear that any of theſe *Tables* do repreſent the Moti-
" ons with the Certainty required; and though many
" times the Agreement ſeems ſurprizing, when the
" Errors of the ſeveral *Equations* compenſate one ano-
" ther; yet in thoſe Parts of the *Orb* where they
" all fall the ſame Way, the Fault is intolerable, and
" the Reſult many times not to be depended on, to
" more than one hundred Leagues; that is to ſay, it is
" wholly inſufficient.

" Yet

" Yet ſtill this Fault is *Artificis*, not *Artis*: For " obſerving the *Period* of the *Lunar Inequalities*, " which is performed in eighteen Years and eleven " Days, or two hundred and twenty-three *Lunati-* " *ons*; it is found that the Returns of the Eclipſes, " and other Phænomena of the Moon's Motion, are " very regularly performed; ſo that whatever Error " you found in a former Period, the ſame is again re- " peated in a ſecond, under the like Circumſtances of " the ſame Diſtance of the Moon from the Sun and " *Apogæon*.

" Thus, from the Obſervation made of the E- " clipſe of the Sun, which was *June* 22, 1666, in " the Morning, ſeen at *London* and *Dantzick*, I " was enabled to predict, with great Certainty, that " other, which I obſerved *July* 2, 1684, by al- " lowing the ſame Error I found in the *Calculus* " of the former. And the like with equal Certainty " will do, in the Caſes *extra Syzygias*, when the " Mean and Synodical Anomolies are nearly the " ſame, about the ſame time of the Year.

" Being thus aſſured, from the Certainty of theſe " Revolutions, that all the intermediate Errors of our " *Tables* were not uncertain Wandrings, but regular " Faults of the *Theories*; I next thought how I might " beſt be informed of the Quantity and Places of theſe " Defects: That being apprized how much, and which " Way my Numbers erred, I might apply the Dif- " ference, ſo as at all times to repreſent the true Mo- " tion of the *Moon*. Nor was there any other Way, " but from the Heavens themſelves, to derive this " Correction, by a ſedulous and continued *Series*

" of *Observations*, to be collated with the *Calculus*,
" and the Errors noted in an *Abacus*: From whence,
" at all Times, under the like Situation of the *Sun*
" and *Moon*, I might take out the Correction to be
" allowed.

" And having by me the *Sextant* I made to
" observe the Southern *Stars* at *St. Helena*, in
" the Year 1677, I fixed it for this Purpose; re-
" solving to have continued to observe, till I had
" filled my *Abacus*, so as it might have the Effect
" of exact *Lunar Tables*, capable to serve at Sea,
" for finding the *Longitude* with the desired *Cer-*
" *tainty*.

" With this Design, I applied the Leisure I had
" procured myself about the Year 1683, to observe di-
" ligently, as often as the Heavens would permit, the
" true Place of the Moon, especially as to Longitude;
" and in the Space of about sixteen Months I had
" gotten near two hundred several Days Observations,
" most of which I collated with the *Horroxian*
" *Theory* (whose *Calculus* is something more com-
" pendious than that of Mr. *Street*) and having pla-
" ced the Errors in an *Abacus*, I perceived how re-
" gular the Irregularities were, and that where the
" Moon had been exactly observed formerly, at the
" Distance of one or more Periods of two hundred
" twenty-three Months, I could even predict the
" Error of the *Tables*, with a Certainty not much
" inferior to that of the Observations themselves.
" But this Design of mine was soon interrupted by
" unforeseen domestick Occasions, which obliged me
" to postpone all other Considerations to that of the

" De-

" Defence of my Patrimony: And, ſince then, my
" frequent Avocations have not permitted me to re-
" aſſume theſe Thoughts.

" In the mean time I have taken Care to preſent my
" Obſervations, ſuch as they are, to the Publick, in
" order to preſerve them; aſſuring, that as on the
" one Hand they were made with a very ſufficient *In-*
" *ſtrument*, with all the Care and Diligence requiſite;
" ſo in the remote Voyages I have ſince taken to aſ-
" certain the *Magnetick Variations*, they have been
" of ſignal Uſe to me, in determining the *Longitude*
" of my *Ship*, as often as I could get Sight of a
" near *Tranſite* of the *Moon* by a known *Fix'd*
" *Star*: And thereby I have frequently corrected
" my *Journal* from thoſe Errors which are unavoid-
" able in long Sea-Reckonings.

" If therefore you happen at *Sea* to obſerve nice-
" ly the Time of an *Occultation* or cloſe *Applica-*
" *tion* of a *Star* to the *Moon*; and can find a cor-
" reſpondent Obſervation, about the ſame mean *Ano-*
" *maly* and Diſtance of the *Moon* from the *Sun* (either
" among theſe of mine, or in any other Collection
" of Obſervations accurately made) eſpecially near
" the ſame Time of the Year; and, above all, after
" the aforeſaid *Period* of eighteen Years and eleven
" Days, you may, without ſenſible Error, from
" thence pronounce in what *Meridian* your *Ship* is;
" taking Care in ſo operoſe a Calculation, to commit
" no Miſtake; and, notwithſtanding the Direction
" the Moon gives you, not confiding ſo much there-
" in as to omit any of the uſual Precautions to preſerve
" a Ship when ſhe approaches the Land.

" I had

" I had intended to inſiſt more largely upon this " Method of obtaining the *Moon*'s *Place*, and, by " Conſequence, the *Longitude* at *Sea*, but that I " find, that it requires a juſt Treatiſe, too long to " be here ſubjoined: And, more eſpecially, that " the great Sir *Iſaac Newton* (to whom no Ma- " thematical Difficulty is inſuperable) has been " pleaſed to give us a *True* and *Phyſical Theory* of " the *Moon*'s Motions, whereby the Defects of all " former *Tables* are ſo far amended, that it is hoped " the Error may ſcarce ever exceed three Minutes of " Motion, or ſo little in *Longitude*; that, perhaps, " it may be thought a ſufficient Exactneſs for all the " Uſes of *Navigation*. If therefore what is here offer- " ed find a kind Acceptance from thoſe that it chiefly " concerns, I ſhall be encouraged to proceed on a " Work I have long meditated, to improve the above- " mentioned *Period*, as to the abbreviating the Com- " putation of *Eclipſes*, and, in general, to facilitate " the too laborious *Calculation* of the *Moon*'s *Place* " *extra Syzygias*.

Not long after her late Majeſty Queen *Anne* was pleaſed to beſtow upon the Publick, an Edition of the much greater, and moſt valuable Part of Mr. *Flamſteed*'s Obſervations; by Help of which the great Sir *Iſaac Newton* had formed his curious Theory of the *Moon*, a firſt Sketch of which was inſerted by Dr. *David Gregory* in his *Aſtronomiæ Phyſicæ & Geometricæ Elementa*, publiſhed at *Oxford*, 1702; and again, in the ſecond Edition of Sir *Iſaac*'s *Principia*, which came out in 1713, we have the

ſame

ſame reviſed and amended by himſelf, to that Degree of Exactneſs, that the Faults of the *Computus* formed therefrom rarely exceed a quarter Part of what is found in the beſt *Lunar Tables* before that Time extant.

Being thus provided with proper Materials, *viz.* a large Set of Obſervations, and a *Theory* of the *Motions* ſo very near the Truth, I reſumed my former Deſign of filling up my *Abacus* or *Synopſis* of the Defects of this *Lunar Theory*, and made Tables to expedite the *Calculus* according thereto, and compared the Numbers thereof with many of the moſt certain of Mr. *Flamſteed*'s Places obſerved. By this it was evident that Sir *Iſaac* had ſpared no Part of that Sagacity and Induſtry ſo peculiar to himſelf, in ſettling the *Epoches*, and other *Elements* of the *Lunar Aſtronomy*, the Reſult many times, for whole Months together, rarely differing two Minutes of Motion from the Obſervations themſelves; nor is it unlikely but good Part of that Difference may have been the Fault of the Obſerver. And where the Errors were found greater, it was in thoſe Parts of the *Lunar Orb* where Mr. *Flamſteed* had very rarely given himſelf the Trouble of obſerving; *viz.* in the third and fourth Quarter of the *Moon*'s Age, where ſometimes theſe Differences would amount to at leaſt five Minutes.

Mr. *Flamſteed* was long enough poſſeſſed of the *Royal Obſervatory* to have had a continued Series of Obſervations for more than two *Periods* of eighteen Years; by which he had it in his Power to have done all that could be expected from Obſervation,

towards

towards discovering the *Law* of the *Lunar Motions*. But he contented himself with sparse Observations, leaving wide Gaps between, so as to omit frequently whole Months together; and in one Case the whole Year 1716. So that notwithstanding what he has left us must be acknowledged more than equal to all that was done before him, both as to the Number and Accuracy of his Accounts; yet for want of an uninterrupted Succession of them, they are not capable of discovering, in the several Situations of the *Lunar Orbit*, what Corrections are necessary to be allowed, to supply the Deficiencies of our *Computus*.

On Mr. *Flamsteed*'s Decease, about the Beginning of the Year 1720, his late Majesty King *George* I. was graciously pleased to bestow upon me the agreeable Post of his *Astronomical Observer*, expressly commanding me *to apply my self with the utmost Care and Diligence to the rectifying the Tables of the Motions of the Heavens, and the Places of the Fix'd Stars, in order to find out the so much desired Longitude at Sea, for the perfecting the Art of Navigation.* These are the Words of my *Commission*; and here I might have thought myself in a Condition to put in Execution my long projected Design of compleating my *Abacus*, or Table of the Defects of our *Lunar Numbers*; but on taking Possession, I found the *Observatory* wholly unprovided of *Instruments*, and indeed of every thing else that was moveable, which postponed my Endeavours till such Time as I could furnish myself with an *Apparatus* capable of the Exactness requisite. And this was the more grievous to me, on account of my advanced

Age,

Age, being then in my ſixty-fourth Year, which put me paſt all Hopes of ever living to ſee a compleat *Period* of eighteen Years Obſervation.

But, Thanks to GOD, he has been pleaſed hitherto to afford me ſufficient Health and Vigour to execute my Office in all its Parts with my own Hands and Eyes, without any Aſſiſtance or Interruption, during one whole *Period* of the *Moon*'s *Apogee*; which *Period* is performed in ſomewhat leſs than nine Years. In this Time I have been able to obſerve the *Right Aſcenſion* of the *Moon* at her *Tranſit* over the *Meridian*, near fifteen hundred times (and with an Exactneſs, I am bold to ſay, preferable to any thing done before) a Number not leſs than thoſe of the noble *Tycho Brahe*, *Hevelius* and *Flamſteed*, taken in one Sum, there being near four of my Lunar Obſervations for each Degree of the Zodiack, as alſo for each Degree of the *Argumentum annuum*, or Diſtance of the *Sun* from the *Moon*'s *Apogee*. And that theſe might be duly applied to rectify the Defects of our *Computations*, I have myſelf compared with the aforementioned Tables, made according to Sir *Iſaac*'s Principles, not only my own Obſervations, but alſo above eight hundred of Mr. *Flamſteed*'s.

This *Compariſon* of my own *Obſervations* (from the Time I eſteem them compleat) with the *Computus* by the ſaid Tables, being now continued for above nine Years, I deſign ſpeedily to communicate it to the Publick, together with the Tables themſelves, which have been printed, and ſhould long ſince have been publiſhed, had not my Poſt at *Greenwich* given me an Opportunity to examine, with proper Nicety, in

what Parts of the *Lunar Orb*, and how much, our Numbers erred. So uſeful an Addition as this, it is hoped may fully anſwer the long delayed Expectation ſome Perſons may have had of ſeeing the ſaid Tables ſooner. By Means thereof, thoſe that are qualified may, if they pleaſe, examine by their own Obſervation the Truth of what is here aſſerted.

Comparing likewiſe many of the moſt accurate of Mr. *Flamſteed*, made eighteen or thirty-ſix Years before (that is one or two *Periods* before mine) with thoſe of mine which tallied with them, I had the Satisfaction to find that what I had propoſed in 1710 was fully verified; and that the Errors of the *Calculus* in 1690 and 1708, for Example, differed inſenſibly from what I found in the like Situation of the Sun and Apogee, in the Year 1726. The great Agreement of the *Theory* with the *Heavens* compenſating the Differences that might otherwiſe ariſe from the Incommenſurability and Excentricity of the Motions of the Sun, Moon and Apogee.

Encouraged by this Event, I next examined what Differences might ariſe from the Period of nine Years wanting nine Days, in which Time there are performed very nearly one hundred and eleven *Lunations*, or Returns of the *Moon* to the *Sun*; but the Return of the *Sun* to the *Apogee* in that Time differing above four times as much from an exact Revolution as in the Period of eighteen Years, I could not expect the like Agreement in that. However, having now entered upon the tenth Year, I compared what I had obſerved in the Years 1721 and 1722, with my late Obſervations of 1730 and 1731, and have rarely found a Difference of

more

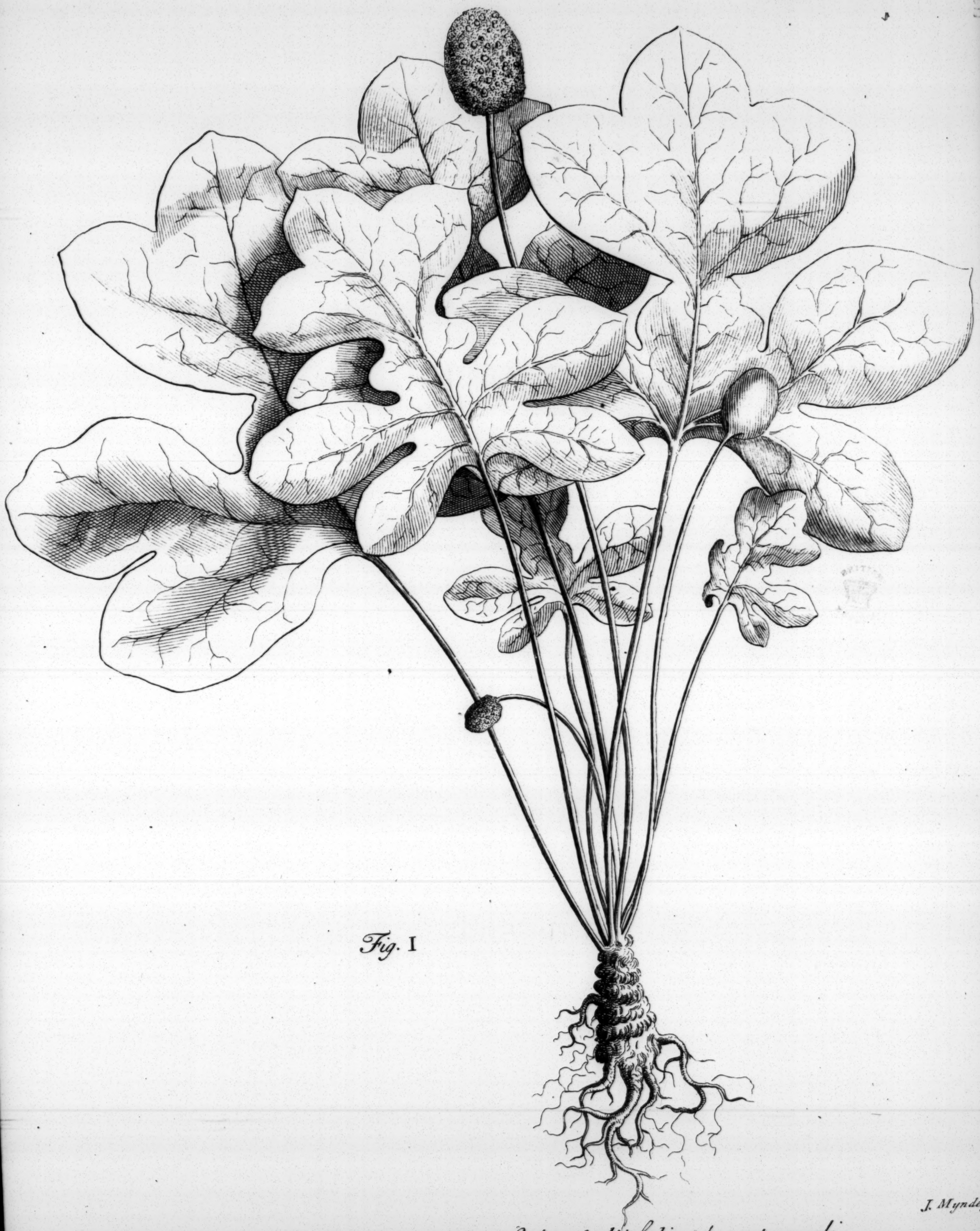

Fig. I

J. Mynde sc.

DORSTENIA *Dentariæ radice, Sphondylii folio, placenta ovali.*

more than one ſingle Minute of Motion (Part of which may probably ariſe from the ſmall Uncertainty that always attends Aſtronomical Obſervation) but moſt commonly this Difference was wholly inſenſible; ſo that by the Help of what I obſerved in 1722, I preſume I am able to compute the true Place of the Moon with Certainty, within the Compaſs of two Minutes of her Motion, during this preſent Year 1731, and ſo for the future. This is the Exactneſs requiſite to determine the Longitude at Sea to twenty Leagues under the Equator, and to leſs than fifteen Leagues in the *Britiſh* Channel.

It remains therefore to conſider after what Manner Obſervations of the Moon may be made at Sea with the ſame Degree of Exactneſs: But ſince our worthy Vice-Preſident *John Hadley*, Eſq; (to whom we are highly obliged for his having perfected and brought into common Uſe the *Reflecting Teleſcope*) has been pleaſed to communicate his moſt ingenious Invention of an Inſtrument for taking the Angles with great Certainty by Reflection, (*Vide Tranſact.* N° 420.) it is more than probable that the ſame may be applied to taking Angles at Sea with the deſired Accuracy.

II. *An Account of the* Contrayerva, *by Mr.* William Houſtoun, *Surgeon in the Service of the Honourable* South-Sea *Company.*

CONTRAYERVA is a *Spaniſh* Word, ſignifying as much as *Herba contra* [*Venena*] or an Herb againſt Poiſons. And as there are in all Countries

different Plants to which that Virtue is aſcribed, the Name of *Contrayerva* ſeems to have been given by the *Spaniards* to as many of them as have come under their Knowledge; for *Hernandez* has deſcribed a Species of *Granadilla* by that Name, and there are ſeveral other Roots that are commonly known by it: But far from pretending to give a Hiſtory of all thoſe Roots, I only offer a ſhort Account of that Plant whoſe Root is called *Contrayerva* here in *England*, and is ſo well known to all that any way deal in Medicines.

The Root itſelf being ſo commonly known, it would be ſuperfluous to deſcribe it, I ſhall therefore confine myſelf to the Deſcription of the Plant that produces it, which I have not hitherto met with to my Satisfaction in any Author.

Father *Plumier*, in his Book entituled, *Nova Plantarum Americanarum Genera*, deſcribes a *Genus* which he calls *Dorſtenia*, whereof I have found two Species in the *Weſt-Indies*, the Roots of which are gathered and exported indifferently, as being very much alike, both in Appearance and Virtues. One of theſe I think may be called

Dorſtenia Dentariæ radice, Sphondylii folio, placentâ ovali, Fig I. And the other *Dorſtenia Dentariæ radice, folio minus laciniato, placentâ quadrangulari & undulatâ*, Fig. II.

The firſt Kind ſeems to be the *Tuzpatli* of *Hernandez*, pag. 147. Its Roots, which are perennial, put forth in the Month of *May* (or as ſoon

Fig. II

J. Mynde sc.

DORSTENIA *Dentariæ radice, folio minus laciniato, placenta quadrangulari et undulata.*

ſoon as it happens to rain) each ſix or eight Leaves four or five Inches long, and as many broad, cut into ſeveral Segments almoſt as deep as the middle Rib, ſomewhat after the Manner of the *Sphondylium*: They ſtand upon Footſtalks five or ſix Inches long; and from the Middle of them come forth other Footſtalks ſomewhat longer, ſuſtaining each a ſtrange Sort of Body, flat, and ſituated vertically, or with one Edge uppermoſt, which I have called *Placenta*. In this Species it is of an oval Figure, with its longer Axis parallel to the Footſtalk. One ſide of it is ſmooth and green like the outſide of the *Calix* in other Plants; but from the other ariſe a great many ſmall yellow coloured Apices; and after they are gone, many ſmall roundiſh Seeds begin to appear, which when ripe are ſomewhat like thoſe of *Gromwell* or *Lithoſpermon*. It grows in the Kingdom of *New Spain*, near old *Vera Cruz*, on the high Ground, by the Side of the River.

The ſecond Kind has much the ſame Number of Leaves growing from each Root, as the former; but of a different Figure, for ſome of them are entire, and ſhaped like thoſe of a *Violet*, others angular, like Leaves of *Ivy*, and ſome almoſt as much divided as the Leaves of the common *Maple*. They are thin, and of a dark green Colour, and ſmooth, or have only a few ſcarce perceptible Hairs on the Back. The Pedicles that ſuſtain the Flowers ariſe immediately from the Root as in the other Species, and attain to the ſame Height of ſix or eight Inches. But the *Placenta* which ſuſtains the Flowers, is in this Kind Quadrangular, waved about the Edges, and broader tranſverſly

than

than vertically. Yet the Flowers and Seeds themſelves are perfectly the ſame as in the other. This ſecond Kind grows plentifully on the high rocky Grounds about *Campechy*, where I gathered it in Perfection in the Beginning of *November*, 1730.

I cannot gueſs why Father *Plumier* has called this a monopetalous Plant; for that which he calls the *Petalum*, and I the *Placenta*, is of a green Colour, and (which is of more Conſequence) ſuſtains the Seeds when ripe, and never envelops the Organs of Generation when young; ſo that I think it can by no Means be called a *Petalum*, nor even properly a *Calix*, and therefore I have given it the Name of *Placenta*, whoſe Office it certainly performs.

I have not been able to obſerve exactly the Structure of the Organs of Generation, becauſe of their exceſſive Smallneſs; but they appear to the naked Eye as they are repreſented in the Figures I have given of them, and in *Plum. N. G. Tab.* 8. The *Dorſtenia Sphondylii folio Dentariæ radice*, of *Plumier*, differs from both of mine; for in his Drawings done by Order of the late King of *France*, whereof I have ſeen a Copy in the Collection of the late Dr. *Sherard*, the Leaves are repreſented ſerrated, the *Placenta* quadrangular, and the Roots conſiſting of ſeveral Knobs tied together Lengthways. From which laſt Particular, I am perſwaded that the Root of that Species is the *Drakena Radix*, mentioned by *Cluſius* in his *Exoticks*, pag. 83.

III. *A Letter from* Jacob de Caſtro Sarmento, *M. D. and F. R. S. to* Cromwell Mortimer, *M. D. Secr. R. S. concerning* Diamonds *lately found in* Brazil.

SIR,

HAVING an Opportunity of diſcourſing with a Gentleman recommended to me, that came from the Gold Mines in *Brazil* belonging to the King of *Portugal*, and brought many Diamonds of conſiderable Value, lately found in thoſe Places, I thought proper to deſire of him an Account of the ſame, being the fitteſt Perſon to deſcribe every minute Circumſtance of it, as one that has liv'd, and digg'd Gold there for theſe fifteen Years laſt paſt; and he having obliged me with the ſaid Account, in the *Portugueze* Tongue, I think it will not be unacceptable to the Society, if you will be ſo good as to offer the Tranſlation of it, which is as follows:

In the Prince's Town, Capital of the County *do Serro do Frio*, belonging to the Government of the Gold Mines, there is a Place near the ſaid Town called by the Natives *Cay the Merin*, where they uſed to dig Gold for many Years, as alſo from a ſmall River called *do Milho Verde*. The Miners that digg'd Gold in thoſe Places did turn up the Ground and Sands of the Banks of the ſaid River, to extract the Gold therefrom, and by ſo doing found ſeveral Diamonds, which

which then they did not prize as ſuch; for ſome of the Miners kept ſeveral Stones for their Figure and Curioſity, which Stones (though ſo valuable) by Length of Time they neglected and loſt, and did the ſame till the Year 1728, at which Time one of the Miners lately coming to work there, and better acquainted, deemed them to be Diamonds, made Experiments upon them, and finding them really ſo, began to ſeek for them in the ſame Ground and Sand, where the former Miners had ignorantly left them, ſo did the reſt of the People follow his Example.

After they had thoroughly examined the Places aforeſaid, they began to ſearch for them in the River itſelf, and do actually find Diamonds there, but with more Trouble and Difficulty; for in the former Places they found them together among the Earth and Sand, as they lay; but in the River, as the Sand is more diſperſed, they lie farther from one another.

Experience and common Reaſon teaches the People there, that theſe Diamonds came from another Place by the Current of the Waters, and are not the natural Product of the Situation where they now are found.

They are uſing all poſſible Diligence to find out the Place where they grow. They have not yet diſcovered it; but their great Hopes are very much encouraged upon the Account of having near the ſaid Situation ſeveral Mountains, where nothing is to be ſeen but fine ſolid Chryſtal Rocks.

The Diamonds that have been found, are commonly from one Grain to ſix Carrats, ſome larger, and among theſe one of forty-five Carrats. The Colour, Solidity, and reſt of their Properties are the ſame as

the

the Oriental ones; only it was obſerved, that thoſe Diamonds that lay more ſuperficially, and expoſed to the Air and Sun were more ſcurfy, and by Conſequence loſt more by poliſhing than the other.

SIR,

Your moſt obliged humble Servant,

Jacob de Sarmento.

IV. *Viri Celeberrimi* Johannis *Marchionis* Poleni, *R. S. S. ad virum Doctiſſimum* Jacobum Jurinum, *M. D. R. S. S.* Epiſtola, *qua continetur* Summarium Obſervationum Meteorologicarum *per ſexennium* Patavij *habitarum.*

JAM ante viginti ferme annos coeperam Meteorologicas Ephemerides ex obſervationibus meis, hic Patavij, conſcribere; plures tamen in adverſariis meis inerant lacunae (varias ob cauſſas, praeſertim quod ſaepe ab urbe abeſſe cogerer) visâ autem *Invitatione tuâ*, Ornatiſſime Vir, *ad Obſervationes Meteorologicas communi conſilio inſtituendas*, quam Londini Anno hujuſce ſeculi vigeſimo quarto edidiſti, rem inpoſterum diligenter curare inſtitui ad exemplar, quod eâdem in Invitatione dediſti; domeſticamque ſe-

dulam vicariam operam inſtruxi; ne, ſi abeſſem, filum obſervationum unquam abrumperetur.

Praecipua eorum, quae obſervavi, conjuncta atque inter ſeſe comparata in Epiſtola hâc reperies; quorum multa ad normam praeceptorum, ex tuâ Invitatione proficiſcentium exarata ſunt. Obſervationum autem reperies collationem, quoad pertinet ad Naturalem Aeris Hiſtoriam; quemadmodum Tu conſilio optimo praecepiſti: Theoremata vero obſervationibus iiſdem haudquaquam inaedificavi. Perſuaſum etenim mihi eſt, perperam agere Architectos, qui Aedificia inchoant, antequam ſatis materiae ad aedificandum praeſto ſit; atque ita etiam ad phyſica ſyſtemata condenda, nimium agi periculoſe, ſi haec incipiantur, et tamen deſit tanta obſervationum copia, quanta veritati firmandae ſufficiat; porro vel in his materiam deficere, plane eſt dicendum. Praeſtat itaque obſervationes congerere, quarum uſus aliquando fortaſſe prodibit. Atque erit ſane perutile, tum meteororum noviſſe hiſtoriam; tum etiam, ne in errores incidamus, a certis effectibus ad eorundem cauſſas poſſe aliquando conſcendere.

Neque tamen me latet, totum hoc obſervationum genus a nonnullis plane deſpici, cum vix ulla praeſens habeatur utilitas; futura vero et dubia, et valde remota eſſe videatur. At etiam Poſterorum gloriae, atque utilitati litandum eſt: et ſane decet ſerere arbores, quae alteri ſeculo proſint: eaſque ſaepe ſerit diligens agricola, quarum aſpiciet baccham ipſe nunquam. Atque, ut ſimilitudine utamur rei noſtrae convenientiore, quis credat quidpiam certi inveniſſe primos illos Saturniae Stellae contemplatores ſpatio unius converſionis Stellae ejuſdem, hoc eſt, triginta annorum ſpatio;

tio; cum Stellam illam aliquando motu ſuo ab occaſu in ortum proficiſci, aliquando ab ortu in occaſum regredi, aliquando fixam veluti eſſe, modo velocem, tardam modo, conſpexere. Pluribus tamen converſionibus tolerantius obſervatis, compertae ſunt certae veraeque leges motuum Stellae illius atque velocitatum. Porro abſit, ut Meteoris tantum tribuam conſtantiae, quantum Stellarum converſionibus tribuendum eſt: at eximias aliquas etiam in illis (ut appellant) regulas pro tempeſtatum atque regionum varietate ineſſe, creatarum rerum omnium harmonia ſumma non ſuadet modo, verum etiam perſuadet.

Et, utcumque tandem ſit, ſatisfaciendum ſane eſt etiam iis, qui plane credunt ex longâ, neque interruptâ obſervationum ſerie poſſe futuris temporibus utiles aliquas cognitiones proficiſci. Et quidem perinde utile erit ſi in meteoris, vel aliquae certae naturae leges, vel perpetuae aliae quaedam naturae variationes, longo temporis tractu, detegentur. Haec autem paullo fuſius ſum perſecutus, ut ex his liquido Tibi appareret, Invitationem tuam a me lubenti animo fuiſſe ſuſceptam; plurimique a me fieri, certâ de cauſsâ, vel hanc partem ſtudiorum, in quae incumbit Illuſtris florentiſſima iſta Regalis Societas fundata ad promovendam Philoſophiam, quam novis jugiter inventis, miroque optimarum artium cultu in dies illuſtrat.

Nunc propius ad rem ipſam accedendo, nonnulla ſubjiciam monita ad res ennarrandas ſpectantia. Itaque in primis animadvertam, in tempore connotando, me diei cujuſque initium a meridie, ut Aſtronomi conſuevere, ſupputaviſſe: Obſervationeſque in Ephemeridum meteorologicarum adverſaria referendas paullo

poſt meridiem inſtituiſſe ; niſi quidpiam me aliquando impedivit, aut tempeſtas aliqua a propoſito me illo abduxit.

Veteri autem Stylo in temporibus deſignandis, et in menſuris Anglico Pede ejuſque Partibus, me uſum fuiſſe, inſtitutum meum ſatis declarat. Si qua erunt, enarrationum progreſſu, ad tempus conveniens Novo Stylo, atque ad Gallicam menſuram referenda ; de Styli atque menſurae mutatione admonebo.

In menſura nivis, hanc liquefieri curavi ; liquatamque ratione eâdem, ac pluviam aquam metitus ſum.

Barometri mei tubulus ſatis amplus eſt, et Vaſis, quo ſtagnans mercurius continetur, diameter eſt ferme vigecupla diametri tubuli : quamobrem aſcendente intra eundem tubulum, et deſcendente mercurio, altitudo mercurij eo in Vaſe tuto poteſt ceu invariata reputari.

Thermometrum meum ex genere illorum eſt, quorum inventio Gulielmo Amontonio, ornamento illuſtri Gallicae Academiae, adtribuitur. Tubulus eſt recurvus deſinens in phialam, cujus phialae pars inferior vivo argento, ſuperior repletur aere ; hujuſque dilatatione vel majore, vel minore, pro varia caloris vi, mercurius in tubulo vel magis vel minus attollitur. Quoniam vero tubuli extremitas patula eſt ; idcirco oportuit veram Thermometri Altitudinem ex Altitudine mercurij obſervatâ in Thermometri tubulo, Altitudineque mercurij in Barometro, collectis in unam ſummam, componere ; inque Ephemerides referre Altitudinem eâdem plane ratione compoſitam. Eſt autem Thermometrum meum appenſum ad parietem

cubiculi

cubiculi (in quo vix unquam ignis accenditur) facie unâ ad meridiem, alterâ ad orientem ſolem obversâ: neque enim aptum locum ad ſeptentriones reſpicientem habeo. Thermometri mei phialâ intra glaciem immersâ ſubſidit mercurius in altitudine Dig. 47. Dec. 30. intra vero ebullientem aquam, aſcendit mercurius ad altitudinem Dig. 63. Dec. 10. Porro iiſdem ſemper Inſtrumentis, et ad eandem jugiter plagam conſtitutis uſus ſum.

Perſpicuum autem, ſi opus eſſet, ex modo relatâ et ſuperioribus obſervationibus fieri poſſet; Hyemali rigidiore tempore aerem noſtrum ad frigus aquae glacialis quamproxime accedere (ut alias in Commentariis Regiae Scientiarum Gallicae Academiae An. 1711. pag. 2. obſervatum fuit, ab aere ſuſcipi eundem frigoris gradum, qui nivi convenit) Aeſtivo autem tempore, aeris noſtri teporem ab aquae ebullientis calore diſtare plurimum: at id vel naturae lumine notum eſt, atque manifeſtum.

Ventorum directiones ſingulis diebus adſcripſi; eorum autem vires dumtaxat cum ſatis patentes, majores, vel maximae fuere, numeris 2, aut 3, aut 4, pro magnitudine eorum ſignavi; praetermiſſo zero, ſive malaciae ſigno; et unitate, venti leniſſimi indicio. Ceterum, etiam me ſilente, nemo in hiſce rebus vel mediocriter verſatus non animadvertit; in infima hac prope nos aeris regione ubi Anemometrorum ſedes eſt, ſaepe unum aliquem ventum obſervari, dum in ſuperioribus aeris regionibus alij diverſique venti dominantur.

Poſt haec vero monita, attingendo rem ipſam, ut aquae pluviae, nec non ex fuſa nive collectae, quantitates

tates (ut ferunt summae ex observationibus desumtae, singulis Mensibus convenientes) considerari queant; eas in subjectam Tabellam conjeci.

	1725.		1726.		1727.		1728.		1729.		1730.	
	Dig.	Dec	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.
Jan.	0	521	1	355	5	955	4	278	1	085	0	112
Feb.			1	460	1	073	1	050	1	245	2	906
Mar.	0	889	3	168	1	878	4	832	2	902	4	592
Apr.	4	019	3	998	0	498	1	419	2	768	1	638
Mai.	3	625	1	368	3	530	3	403	2	634	4	467
Jun.	0	036	2	608	2	476	2	103	3	134	6	205
Jul.	2	297	2	357	2	930	4	016	4	526	2	339
Aug.	5	185	1	268	5	067	5	186	0	578	4	269
Sep.	2	647	2	900	4	164	6	948	3	267	1	090
Oct.	7	104	0	179	6	576	5	163	6	294	5	254
Nov.	3	636	2	277	5	091	6	836	4	186	0	534
Dec.	0	030	2	390	7	169	7	599	2	804	0	894
Sum. totius anni.	29	989	25	328	46	407	52	833	35	423	34	300

Si iidem Menses illorum sex annorum colligantur in unam summam, comperietur ex Tabellâ minimam aquae quantitatem decidisse Mensibus Februariis; quippe quae non excesserit Dig. 7. Dec. 734. Maximam vero Octobribus Mensibus, quae Dig. 30. Dec. 570, aequaverit. Praeterea ex Tabellâ eâdem facile apparet, sicciorem annis aliis fuisse annum 1726, qui dedit aquae Dig. 25. Dec. 328: aliis autem annis humidiorem fuisse Annum 1728, quo collegi aquae Dig. 52. Dec. 833.

Numeros praeterea quantitatum aquae, singulis quae anni Tempestatibus decidit, seorsum collegi;

Tem-

Tempeſtates ita partiens pro quocunque propoſito anno; ut Hyemis initium referrem ad decimam diem Decembris anni praecedentis, et ſic porro ad diem decimam Martij, Junij, atque Septembris Tempeſtatum reliquarum initia conſtituerem. Inventae ſummae, in Tabellâ notatae, ſub oculis poſitae ſequuntur.

	Hyems.		Ver.		Aeſtas.		Autumnus.	
	Dig.	Dec.	Dig.	Dec.	Dig.	Deg.	Dig.	Dec.
1725	0	912	8	167	7	584	13	327
1726	2	815	9	6	7	355	4	999
1727	8	181	5	916	11	875	15	497
1728	11	419	10	752	12	83	20	556
1729	7	470	9	430	6	310	13	617
1730	8	693	8	817	12	818	6	562
Sum.	39	490	52	88	58	25	74	558

Ex quâ Tabellâ proclive eſt noſcere quantitatem aquae pertinentis ad Aeſtatem et Autumnum, ſingulis annis majorem fuiſſe quantitate aquae pertinentis ad Hyemem et Ver.

Quod ſi quantitates ad quamlibet Tempeſtatem pertinentes colligantur in unam ſummam; et deinde hae ſummae conferantur inter ſeſe, facile liquebit, incrementa progredi eodem ordine ac Tempeſtates; ordiendo ab Hyeme; hoc eſt; Quantitatem minimam aquae Hyemis tempore haberi, tempore autem Veris majorem, hanc vero ſuperari ab Aeſtatis tempore, demum Autumnali tempore maximam reperiri.

Notum

Notum autem eſt et pervulgatum, pluviam a decreſcente Barometri altitudine, ſerenitatem vero a creſcente altitudine indicari. Ut igitur aliquo modo explorarem, quantum poſſint indicia illa, ut ex Barometro futurae pluviae anticipata cognitio aliqua habeatur; dies, quibus pluit ſex illis propoſitis annis collegi in varias ſummas pro Ventorum varietate, atque pro incremento aut decremento altitudinis Barometri a Meridie praecedentis Diei ad Meridiem Diei ejus quo pluit. Tabellam autem ipſam ſubjeci.

Decreſcente Barometro a Meridie Diei praecedentis ad Meridiem Diei, quo pluit.		Creſcente Barometro a Meridie Diei praecedentis ad Meridiem Diei, quo pluit.	
Numerus Dierum, quibus pluit.	Ventus qualis erat Meridie Dierum, quibus pluit.	Numerus Dierum, quibus pluit.	Ventus qualis erat Meridie Dierum, quibus pluit.
86	N.	64	N.
61	NE.	41	NE.
33	E.	16	E.
28	SE.	17	SE.
44	S.	21	S.
42	SW.	15	SW.
49	W.	20	W.
35	NW.	17	NW.
378	Summa.	211	Summa.

Quâ abſolutâ Tabellâ, miratus profecto ſum inter numeros incrementi decrementique altitudinis Barometri

metri non majorem differentiam intereſſe quam ea, quae inter 378 et 211 intercedit.

Fateor equidem; aliquoties creſcente Barometri altitudine a praecedente Meridie ad Meridiem Diei, quo pluit, coepiſſe tamen altitudinem eam decreſcere poſt Meridiem Diei ejuſdem, quo pluiſſe contigit: praeterea vero incrementum illud aliquoties ſumi poſſe, tanquam indicium futurae, poſt haud longam pluviam, ſerenitatis: rationem etiam quantitatis pluviae eſſe habendam.

Saepe tamen nulla ex hiſce (ut ita dicam) excuſatio praeſto eſſe poteſt, ut ſervetur conſtantia legis illius paullo ſupra indicatae; qua a nonnullis ſancitur, decrementa altitudinis Barometri eſſe pluviae indicia, incrementa vero ſerenitatis indicia eſſe reputanda. Aliquid aliud detegendum adhuc eſt ad praenoſcenda phaenomena haec. Quod ſi tamen deerit Obſervatorum induſtria, atque aſſiduitas, fortaſſis variationum hujuſcemodi leges aliquando detegentur; et *veniet tempus, quo iſta, quae nunc latent, in lucem extrahat dies, et longioris aevi diligentia:* et fortaſſis non erunt difficilia, ac *Poſteri noſtri nos aperta neſciſſe mirabuntur.*

Nivalium poſtea Dierum, propoſitis ſex illis annis contentorum comparationem inſtitui ſuperioris illius ſimilem; atque illud animadverti, quod Nix magis, quam pluvia, Barometri decrementis reſpondeat: ut in ſubjectâ Tabellâ videre eſt.

Decreſcente Barometro a Meridie Diei praecedentis ad Meridiem Diei, quo ninxit.		Creſcente Barometro a Meridie Diei praecedentis ad Meridiem Diei, quo ninxit.	
Numerus Dierum, quibus ninxit.	Ventus qualis erat Meridie Dierum, quibus ninxit.	Numerus Dierum, quibus ninxit.	Ventus qualis erat Meridie Dierum, quibus ninxit.
4	N.	4	N.
6	NE.		
1	E.		
1	SW.		
1	W.		
1	NW.		
14	Summa.	4	Summa.

Praeterea vero, ut a tua, Vir Ornatiſſime, Invitatione indicatur; pro ſingulis annis ſummas altitudinum Barometri ac Thermometri confeci; ex quibus deinde altitudines medias convenientes ſingulis Diebus eorundem Annorum elicui; ut in ſubjectâ Tabellâ apparet.

	Summa Altitudinum Barometri.		Summa Altitudinum Thermometri		Altitudo Media Barometri ad ſingulos dies.		Altitudo Media Thermometri ad ſingulos dies.	
	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.
1725	10854	26	18287	66	29	74	50	10
1726	10823	8	18268	93	29	65	50	5
1727	10831	17	18325	96	29	67	50	21
1728	10864	72	18419	81	29	68	50	33
1729	10842	23	18326	62	29	70	50	21
1730	10853	75	18264	18	29	74	50	4

Porro

Porro ſi Altitudines Barometri, non ſingulorum Annorum, ſed omnium ſex Annorum in unam tantum ſummam colligantur, invenietur media Barometri Altitudo, ſingulis Diebus eorundem omnium annorum conveniens, eſſe Dig. 29. Dec. 70.

Ac ſi Thermometri Altitudines, non ſingulorum Annorum, ſed itidem ſex Annorum omnium colligantur in unam tantum ſummam, comperietur media Thermometri Altitudo ſingulis diebus eorundem omnium Annorum conveniens, eſſe Dig. 50. Dec. 16.

Quamobrem, inſpectâ Tabellâ, facile eſt intelligere, Diales Medias Altitudines tum Barometri tum Thermometri, pertinentes ad annos ſingulos, pauciſſimis partibus diferre a Dialibus Mediis Altitudinibus, quae ex ſex illis annis collectim ſumtis proficiſcuntur.

Maximam deinde Barometri Altitudinem Minimamque, itidem Thermometri Maximam ac Minimam Altitudinem in oppoſitam Tabellam redegi: ut uno aſpectu conferri inter ſeſe poſſent atque comparari.

Anni	Menſes.	Dies S. V.	Hora	Maxima Barometri Altit.		Minima Barometri Altit.		Thermometri. Altit.		Venti	Tempeſtas.
			h. ′	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.		
1725	Jan.	19	15	30	28			48	45	W.	Coelum ſudum.
	Dec.	8	4 15			28	56	47	98	SW. 4.	Coelum nubibus fere obductum.
1726	Nov.	28	15	30	18			48	70	N.	Coelum ſudum.
	Feb.	13	15			28	92	48	62	S W.	Coelum nubibus fere obductum.
1727	Nov.	20	15	30	24			48	88	NW.	Coelum ſudum.
	Oct.	29	3			28	80	49	6	S. 2.	Coelum nubibus obductum.
1728	Dec.	2	15	30	20			48	98	N.	Nubes rarae.
	Dec.	12	15			29		48	60	N.W.	Pluvia tenuis.
1729	Dec.	20	15	30	30			48	88	W.	Coelum nubibus fere obductum.
	Nov.	10	15			28	90	49	30	N.	Pluvia.
1730	Dec.	20	15	30	40			48	20	N.	Coelum ſudum.
	Feb.	27	15			28	98	48	78	S E.	Sol et nubes alternatim.

Anni	Menſes.	Dies S. V.	Hora	Barometri Altitudo.		Maxima Ther. Altit.		Minima Ther. Altit.		Venti	Tempeſtas.
			h. ′	Dig.	Dec.	Dig.	Dec.	Dig.	Dec.		
1725	Jul.	9	15	29	64	52	50			S. 2.	Coelum ſudum.
	Dec.	23	15	29	25			47	82	N E.	Sol et nubes alternatim.
1726	Jul.	15	15	29	74	52	40			S.	Coelum ſudum.
	Jan.	14	15	29	68			47	68	W.	Coelum nubibus fere obductum.
1727	Jul.	13	15	29	60	52	18			E.	Sol paucaeque nubes.
	Jan.	2	15	29	68			48	15	S E.	Aer nebuloſus.
1728	Jun.	22	15	29	68	52	54			S.	Sol paucaeque nubes.
	Dec.	26	15	29	30			48	8	N. 2.	Coelum nubibus fere obductum.
1729	Jun.	25	15	29	70	52	28			N E.	Coelum ſudum.
	Jan.	14	15	29	50			47	82	SW.	Coelum ſudum.
1730	Aug.	4	15	29	76	52	28			N.	Sol et nubes alternatim.
	Dec.	23	15	30	30			47	58	W.	Coelum ſudum.

Ut vero aquae, quae decidit, Quantitates conferri poſſent cum Quantitatibus iis, quae in Regiae Scientiarum Academiae Commentariis regeruntur; Menſuras Anglicas in Gallicas tranſtuli, illas ad Regium Pariſienſem Pedem (in Pollices atque Lineas diviſum) referendo. Ac ſummas ad Annum quemlibet Novo Stilo computatum confeci, ut in ſubjectâ Tabellâ videre eſt.

Anni Stilo Novo.	Pol. Ped Pariſ.	Lin.
1725	28	$1\frac{1}{2}$
1726	23	$2\frac{1}{2}$
1727	42	11
1728	49	$9\frac{1}{5}$
1729	34	$1\frac{2}{5}$
1730	32	$1\frac{5}{6}$
Summa.	210	$3\frac{1}{2}$

Quare, ſi Pol, 210. et Lin. $3\frac{1}{2}$. dividantur in annos ſex; Menſura Media Quantitatis aquae, quae decidit, conveniens ſingulis annis prodit Pol. 35. Lin. $\frac{7}{12}$. Menſura autem Media aquae quae cadit Lutetiae Pariſiorum (ut habetur in Academiae Commentariis An. 1711, 1714, 1715, et alibi) Media, pro unius Anni curriculo Pollicum 19 eſſe computatur. Quamobrem Patavina Media Menſura Mediam Pariſienſem excedit Pollicibus 16. Lin $\frac{7}{12}$. Aut, ſi aſſumamus pro Mediâ Menſurâ Pariſienſi Pol. 18. Lin 8. (quemadmodum ex obſervationibus triennio habitis colligitur in Commentariis An. 1719) erit differentia

Pol.

Pol. 16. Lin. $4\frac{1}{2}$. Itaque plane liquet aquae copiam hic decidere multo majorem, quam Lutetiae Parisiorum.

Praestat etiam animadvertere, a Meridie Diei 23. (ST. V.) Augusti Anni 1727. (vento boreali) ad Meridiem sequentis diei, nimirum intra horas 24, decidisse pluviae Pol. 3. Lin. $\frac{1}{2}$. hoc est Lin $36\frac{1}{2}$. Quae sane pluviae copia multo major reperitur eâ, quae intra horas 24, unquam decidat Lutetiae Parisiorum: ut ex Commentariis Regiae Scientiarum Academiae colligere est.

Si maxima Barometri Altitudo Die 20 Dec. 1730. hic observata, redigatur ad Gallicam Mensuram, comperietur esse Pollicum 28. Lin. 6. minima vero Barometri Altitudo, quae pertinuit ad Diem 8 Dec. 1725, invenietur Pollicum 26. Lin. $9\frac{1}{4}$. Quamobrem Mercurij in Barometro differentia inter Maximam Altitudinem, Minimamque colligetur Pollicum 1. Lin. $8\frac{1}{4}$.

Assumto itidem sexenio Observationum, quas in Regio Observatorio habuit Lutetiae Parisiorum Philippus Hirius (nimirum ab Anno 1699 ad annum 1705) inveni MaximamBarometri Altitudinem extitisse Die 10 Dec. 1704. Pol. 28. Lin. $4\frac{1}{6}$. Minimam vero Die 20 Dec. 1703. Pol. 26. Lin. 5: atque ideo Mercurij in Barometro differentiam inter Maximam Altitudinem Minimamque fuisse Pol. 1. Lin. $11\frac{1}{6}$. Differentia itaque inter Maximam atque Minimam Mercurij in Barometro Altitudinem (attentis observationibus, quas proposuimus) Lutetiae Parisiorum inventa fuit major, quam Patavij Lin. $2\frac{1}{12}$. Et quidem jamdudum nonnulli fuere, qui observarent, illiusmodi

modi differentias eo minores reperiri, quo magis loca, in quibus Obſervationes inſtituuntur, ſunt Aequatori circulo vicina.

Reliquum nunc eſt ut ad aliud Obſervationum genus in Invitatione indicatum, hoc eſt ad Obſervationes Declinationum Magneticae Acus, gradum faciam: ab hac tamen parte me paucis expediam. Notum hoc tempore eſt, atque inter hujuſcemodi rerum Peritos pervulgatum, variis unius ejuſdemque Diei horis exiguas nonnullas mutationes in Acus Magneticae Declinatione ita contingere, ut ſingulis integris Diebus eadem omnino conſtantiſſima Declinatio non obſervetur; ſed paucis varietur aliquando Gradus ſexageſimis: praeterea vero compertum eſt, non ab omnibus Acubus (praeſertim ad varios Magnetes affrictis) eandem prorſus penituſque exhiberi Declinationem, ſed aliquot (pauciſſimarum tamen cum ab excellentibus Artificibus Acus ſunt elaboratae) ſexageſimarum differentias aliquando comparere. Variationes itaque perexiguas ab hiſce cauſſis facile promanantes, ſi excipias, totis hiſce ſex ſolidis annis, Magnetis Declinationem verſus Occaſum Graduum tredecim obſervavi. Pyxis Magnetica, qua praeſertim utor, et cujus (ut ita dicam) fidei plurimum tribuo, eſt Opus Bernardi Facini ſcientis Artificis, maxime harum rerum periti, maximeque induſtrij: cujus Pyxidis Acus longa eſt Pollices ſex, granorum triginta duorum pondo. Hoc unum adjiciam, me ſuſpicari (neque enim de tam exigua mutatione quidpiam ſecure affirmandum eſt) Declinationem Acus intra illud tempus, decreviſſe decem ſexageſimis potius, quam creviſſe.

Haec

Haec habui, quae, Invitationis tuae finem reſpiciens ad Te, Vir Ornatiſſime, ſcriberem. Unà etiam cum Epiſtolâ hâc, integrae Ephemerides, (quibus ſingulorum Dierum Obſervationes meae, qua ratione Invitatio tua fert, conſignantur) Tibi tradentur, tamquam ſpecimen; ex quo, ſi Deus dederit, ut poſt aliquot annos quaedam alia in formam hanc colligam, intelligere facile queas, me tuae Methodo in ſcribendis obſervationibus adhaeſiſſe. Si quid frugis in Obſervationibus hiſce aliquando reperietur, Tibi, tuiſque de optimis Artibus meritis tribuendum erit. Vale.

Patavij, Kal. Jun.
CIↃ IↃCC XXXI.

V. *An Account of a Book entituled,* J. P. Breynij *M. D. &c.* Hiſtoria Naturalis Cocci Radicum Tinctorij, quod Polonicum vulgò audit. 4^to^ Gedani, 1731. Cum Figuris coloribus nativis pictis. *By* Richard-Middleton Maſſey, *M. D. F. R. S. and Honorary Fellow of the College of Phyſicians.*

THE Author (after having briefly accounted for the two Kinds of the *Cocci Tinctorij* now in Uſe, *viz.* that of *Pliny* collected from the *Ilex*, and the *American Coccus*, or *Cochinil*) proceeds to give us the Natural Hiſtory of the *Coccus Polonicus*, which

which he calls *Radicum*, becauſe it is chiefly found adhering to the *Roots* of the *Polygonum Cocciferum*, **Koſmaczeh Polonis C B.* This he takes to be the *Polygonum Germanicum, incanum, flore majore perenni Raij.* Of which he has given a Print with the *Cocci*, as they ſtick to the Roots.

The *Coccus* he ſays, is found ſometimes ſingle, ſometimes more, even forty adhering to one Plant, of different Sizes, from a Poppy-ſeed to that of a white Pepper-corn. It is roundiſh, ſmooth, and of a Purple Violet Colour, and in a thin Cuticle incloſes a Blood-red *Succus:* One Half or more of it is covered with a rough, dark, brown Cruſt, by which it adheres to the Roots.

The Countrymen gather it about *Midſummer*, and dry it with a ſlow Fire in Earthen Platters.

Several of theſe *Cocci* he expoſed to the Sun in open Glaſſes, and found that by the 24th of *July* every one, according to its Size, had excluded a ſmall Worm with ſix Feet. That Part which ſeemed to be the Head, had two ſhort carnoſe *Antennæ*; for he could not perceive with Glaſſes any thing like either Mouth or Eyes. On the Back Length-ways, were two *Sulci*, which were more or leſs viſible, according to the different Motions of the *Animalculum*. Its Feet ſeemed armed with Claws, and the firſt Pair ſtronger and darker than the reſt. The whole Worm was of an obſolete Purple Colour, and had ſeveral Briſtles of a brown Grey.

* Koſmaczek Piloſella. Herbario Polon.

These, after ten or fourteen Days, lay in a State of Rest, and soon became covered with an exceeding white fine lanuginose Substance; in which Condition they continued five or eight Days longer, and then laid their Eggs, fifty, one hundred or more a-piece; which to the naked Eye appeared but like so many red oblongish Points, but with Glasses looked like Ants Eggs, almost transparent, with a diluted Blood-red Content.

These Eggs being again exposed in the Sun about *Bartholomew*-Tide, were hatch'd a Month after, when some *Vermiculi* were excluded, which in the Microscope appear'd to be Hexapods of a purplish Hue, with two *Antennæ* at their Head, and two greyish Bristles at their Tails, scarce visible except upon black Paper.

He supposes these last excluded *Vermiculi*, after some Wanderings, at last fix themselves to the Roots, and some of the lowest contiguous Branches of the *Polygonum*, where being deprived of local Motion and Sense, by some Way or other they imbibe that *Succus* from the Plant, and at last become the *Cocci* so called, or Vesicles full of that Blood-red *Succus* so useful in Dying.

VI. *A* Botanical Invitation *to forward an Hiſtory of the Plants of* Swiſſerland; *by Dr.* John Jacob Scheuchzer, *M. D. F. R. S. ſent to Sir* Hans Sloane, *Bar^t. Pr. R. S. to be communicated to the* Royal Society. *Tranſlated by Mr.* Zollman, *F. R. S.*

IT is not my Intention to enter into a long Detail of what I have hitherto performed in Natural Hiſtory, both in general, and that of *Swiſſerland* in particular, leſt I might ſeem guilty of Vanity even in merely relating it. Any body, that is acquainted with my Writings concerning the Natural Hiſtory of *Swiſſerland*, will be ſenſible that we ſtill want a *Botanography*, or Deſcription of the Plants, which is one of its principal Parts; nay, that to which I chiefly have applied myſelf, and I dare add, without Offence to the cenſorious, which the World has long been in Expectation of: Some Obſervations diſperſed in my *Itinera Alpina*, publiſhed at *London* and *Leiden*, have raiſed a Deſire for it among Botaniſts. It will thence appear to every one who applies himſelf to a Study as difficult as it is delightful, that I ſpared neither Labour nor Expences in ſearching after Plants of all Kinds that grow ſpontaneouſly in *Swiſſerland*, and deſcribing them in the Places where they grow, in gathering them into Herbals, in comparing them with the Deſcriptions and Characters given of them by *Geſnerus*, the *Bauhin's*, *Ray*, *Tournefort*, *Boccone*, and others, in ſeparating what ought to

be ſeparated, in joining what ought to be joined, in reſolving what is dubious, in retrenching what is ſuperfluous, in ſupplying what is defective, in ſhewing the Uſe of native Plants, and trying them myſelf in my Practice. Of theſe my *Hiſtory of* Swiſs *Plants*, which I am now hard at Work upon, is to conſiſt: Of which, and its Method, I intend now to give a brief Account, and draw up a Sort of Plan of it, in order to engage other Perſons by this Invitatory Paper, as I may call it, to join with me in this Labour.

This Work will be in the Form of a Dictionary, to the End it may ſerve at the ſame time for an *Index*. I therefore am diſpoſing in an Alphabetical Order, the various Kinds and Characters, ſubjoining to each of them the proper Species hitherto obſerved in *Swiſſerland*, either by myſelf or by others, together with the ſynonymous Names uſed by the different Authors, which are again tobe inſerted in their proper Places, according to the Order of the Alphabet. I am adding, and remarking, under each Plant, whatever ſeems to be wanting in their Deſcription by other Authors, or is any ways neceſſary for the fuller Knowledge of them, or is applicable to Medicinal or other Uſes. Beſides other Prints, there will appear in the Work itſelf thoſe of *Fuchſius* in Folio, I having purchaſed the Original Plates. I would add all the *Alpine* Plants, had I ſome Patrons at Hand who would bear the Expence of engraving the Copper Plates, or doing the wooden Cuts; an Aſſiſtance which may be beſt expected from the *Engliſh* Nation, and their *Society*.

Zurich, November the 6th, 1731. **John Jacob Scheuchzer.**

VII. *An Account of what appeared moſt remarkable on opening the Body of* Ann Edwards, *who died* January 5*th*, $17\frac{29}{30}$, *having a large* Umbelical Rupture. *Communicated to the* Society *by* John Ranby, *Eſq*; *Surgeon to his Majeſty's Houſhold, and F. R. S.*

ABOUT ſix Years ago having ſome Difference with her Husband, he gave her a Kick on the Belly; and from that Time ſhe complained of Pain, and a Swelling about the *Navel*, which in Time encreaſed to about the Size of a Man's Head, ſeldom giving her any Uneaſineſs but by its Weight; and that chiefly when her Bandage was off, which ſhe generally wore, except when her Diet, or any other Accident, brought on a *Diarrhæa*, which was always attended with Cholick Pains, particularly in the Rupture; to eaſe which ſhe had been adviſed to iron it with a hot Iron, and had thereby ſo often burnt it, that there remained on the Skin ſeveral large *Cicatrix's*. Three Days before her Death ſhe was taken with the *Diarrhæa*, attended with a ſlight Fever.

On opening the *Bag*, the *Cawl* firſt preſented, the greateſt Part whereof adhered to the *Peritonæum*: On removing this, the *Small Guts*, to the Length of two Ells and a half, were contained in this *Bag*, together with all the *Colon*, except ſo much of it as is below the left *Kidney*; and the Beginning of the *Colon*, with

with the *Cœcum*, were attached to the *Meſentery*, in ſuch a Manner, as to be but two Inches diſtant from the *Pylorus*; which, with about one Third of the *Stomach*, was by this Means drawn into the *Bag*. The Beginning of the *Duodenum* juſt entered the *Bag*, and then returned out again; which with but a ſmall Portion of the *Jejunum*, was the Chief that remained in the *Abdomen*.

FINIS.

ERRATA.

NUM. 420. p. 179. in Titulo V. lin. 4. adde poſt *Jeſu*, ad Rev. P. Joh. Bapt. Carbone tranſmiſſa, &. Num. 421. p. 216. in Title V. l. 2. after *M. D.* add *F. R. S.* and l. 5. dele *coloribus nativis pictis.*

Numb. 422.

PHILOSOPHICAL TRANSACTIONS

For the Months of *January*, *February*, and *March*, 1732.

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II. *A Letter concerning the* Electricity *of* Water, *from Mr.* Stephen Gray *to* Cromwell Mortimer, *M. D. Secr. R. S.*

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VI. *An Extract of a Letter from* Oliver St. John, *Eſq; F. R. S. dated from* Florence, November *the* 30*th*, 1731. N. S. *Communicated by* R. Graham, *F. R. S. concerning the* Arcutio.

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Jos: Banks

I. *A Catalogue of the fifty* Plants *from* Chelsea-Garden, *presented to the* Royal Society *by the Company of* Apothecaries, *for the Year* 1730; *pursuant to the Direction of Sir* Hans Sloane, *Bar. Med. Reg. Præs. Col. Reg. Med. & Soc. Reg.* 1 *by* Isaac Rand, *Apothecary, F. R. S.*

401. ADHATODA Zeylanensium. Hort. Lugd. Bat. 642.

402. Ageratum foliis serratis. C. B. 221. *Ageratum plerisque; Herba Julia quibusdam* J. B. III. *pag.* 142.

403. Ageratum, breviori & latiori folio. *Ptarmica lutea, suaveolens; corymbis longioribus & magis compactis.* T. Inst. 497.

404. Ageratum Hispanicum; amplioribus foliis; flosculis minoribus.

405. Anonis pulchra visu; folio Ciceris; Ornithopodij siliquis, annuentibus; Hort. Cath. 18.

406. Aparine semine Coriandri saccharati. Park. Theat. 567.

407. Aparine semine lævore, Raij Hist. 484.

408. Aparine minima, D. Sherard. Raij Syn. Ed. 2. 118.

409. Arundo arborea Indica; amplo, pediculato folio. *Bambu altera species.* Raij Hist. 1316. *Beesha.* Hort. Malab. Tom. 5. Tab. 60.

410. Canna Indica; radice alba, alexipharmica, Sloan. Cat. Jam. 122. Hiſt. Tab. 149. Fig. 2. *Arrow-root.*

411. Caryophyllata vulgaris. C. B. 321.

412. Caryophyllata, aquatica, nutante flore C. B. 321.

413. Caryophyllata major; nutante flore.

414. Caryophyllata Virginiana; albo flore, minore; radice inodora. H. Lugd. Bat. 121.

415. Caucalis Monſpeliaca; echinato magno fructu. C. B. 153.

416. Chamædrys Alpina, fruteſcens; folio ſplendente. T. Inſt. 205.

417. Chamæmelum montanum; Abſinthij folio; Parthenij odore. Hort. Cath.

418. Chamæmelum incanum; Abſinthij vulgaris folio, D. Vaillant. Ac. Reg. Sc. 1720.

419. Chamæmelum Hiſpanicum, humile, ramoſiſſimum; Cotulæ fœtide facie.

420. Chelone Acadienſis; flore albo. D. Tournef. Ac. Reg. Sc. 1706. Joſſelyn *New-England's Rarities, Numb.* 6. *pag.* 78 & 79.

421. Eupatoriophalacron, Balſaminæ fœminæ folio; flore albo diſcoide. D. Vaillant, Ac. Reg. Sc. 1720. *Scabioſa-Conyzoides Americana; capitulis & floribus albidis parvis* P. B. P. Pluk. phyt. Tab. 109. Fig. 1.

422. Eupatoriophalacron Americanum, procumbens; albis floribus; foliis parvis undulatis, aſperis.

423. Eupatoriophalacron Americanum; ſcrophulariæ acutiore folio; diſco luteo, prominente, ſtipato, vix radiato.

424. Eu-

424. Eupatoriophalacron Indicum; ſcrophulariae folio; capitulo parvo, radiis quinis ad Baſin ornato, hiſpidis & glutinoſis.

An Cichoreo affinis Lampſana Sinica, Mentaſtri foliis; calyce fimbriato, hiſpido. Sinice *Hi-him-tſaw dicta?* Pluk. Amalt. 58. Phyt. Tab. 380. Fig. 2.

425. Fœnum Græcum ſativum. C. B. 348.

426. Fœnum Græcum, ſylveſtre; polyceration, majus, Creticum. Breyn. Cent. 79.

427. Fœnum Græcum ſylveſtre, polyceration, minus, Monſpeliacum. Breyn. Cent. 79. *Hedyſarum minimum, Dalechamp.* Hiſt. Lugd. 446.

428. Herniaria glabra. I. B. III. 378.

429. Herniaria hirſuta. I. B. III. 379.

430. Lyſimachia ſpicata; flore albo; ſalicis folio. T. Inſt. 141.

431. Medica ſcutellata. I. B. II. 384.

432. Medica hirſuta; echinis rigidioribus. I. B. II. 385.

433. Medica magna, turbinata. I. B. II. 385.

434. Medica tornata, minor, lenis. Park. Theat. 1116.

435. Medica maritima, noſtras; modiolis Spinoſis. *Trifolium cochleatum; modiolis ſpinoſis.* Raij Syn. Ed. 2. 197.

436. Medica fructu ovali ſpinoſo. *Medica ſiliqua ♂. fructu ovali, Spinulis brevioribus & rigidioribus.* Raij Hiſt. 963.

437. Medica Orientalis; fructu rotundiore, ſubhirſuto, tuberculis raris obſito.

438. Medica Hiſpanica; fructu echinato, ſubhirſuto, ſphæroide.

439. Medica echinata, minima I. B. II. 386.

440. Medica marina. Lob. Icon. 38. *Trifolium cochleatum, maritimum, tomentoſum.* C. B. 329.

441. Melilotus Meſſanenſis, procumbens; folliculis rugoſis, ſublongis; ſpicis florum brevioribus. Raij Hiſt. 952.

442. Ornithopodium ſcorpioides; ſiliqua compreſſa. T. Inſt. 400.

443. Papaver luteum, perenne; laciniato folio; Cambro-britannicum. Raij Syn. Ed. 3. 309. *Argemone lutea Cambro-britannica.* Park. Theat. 369.

444. Papaver ſpinoſum. C. B. 171.

445. Pſeudo-Ipecacuanha Noveboracenſis Dni Colden.

An *Periclymenum herbaceum, rectum, Virginianum*, Dr Tinkars-weed, *vulgo vocatum?* Pluk. Alm. 287. Phyt. Tab. 104. f. 2.

446. Ptarmica Agerati folio, acutiori. *Ageratum album* vulgo.

447. Ranunculus arvenſis, echinatus. C. B. 179.

448. Ranunculus arvenſis; ſeminibus magis echinatis. D. Sherard. Boerh. Ind. alt. 32.

449. Ruyſchiana; flore cæruleo, magno. Boerh. Ind. alt. 173. *Chamæpitys cærulea auſtriaca.* C. B. 250.

450. Veronica fruticoſa erecta, dulcis; hexangulari caule; flore dilutè cæruleo. Sloan. Cat. Jam. 81. Hiſt. Tab. 108. f. 2.

II. *A Letter concerning the* Electricity *of* Water, *from Mr.* Stephen Gray *to* Cromwell Mortimer, *M. D. Secr. R. S.*

SIR,

THE Approbation the former Communication of my Electrical Experiments (*Transact. Numb.* 417.) to the *Royal Society* did meet with, by their most generous Encouragement, hath been a great Inducement to me to go on with them, to see what farther Discoveries I can make upon the Subject of this Species of Attraction. I shall at present communicate only two Experiments; the first shewing that Water may have an Attractive Vertue communicated to it from an Electrick Body; the other, that Water is not only attracted by the Tube, or any other absolutely Electrick Body, but that this Attraction is attended with several remarkable Circumstances.

I. In the former Account of my Experiments, I described the manner of communicating an Attraction to a Bubble of soaped Water; but I have now found, that even *a Body of Water receives an Attractive Vertue, and also a Repelling one, by applying the excited Tube near it, after the same manner as solid Bodies do.* To perform this Experiment, I caused a wooden Dish to be turned, with a Screw-hole at the Bottom, but not so far as to come through the Wood: This was screwed on to the upper End of one of the Stands I have mentioned in the other Experiments, the other Top being taken off: The Dish was about four-

four Inches Diameter, and one Inch deep. Then the Stand was ſet on a Cake of Roſin, or a Plate of Glaſs, or the Brims of a Drinking-Glaſs, or of a Cylindrick one, ſuch as are uſed for Water Glaſſes. The Glaſs muſt be firſt warmed, then the Diſh being filled with Water, the Tube rubbed, and moved both under the Diſh and over the Water three or four times, without touching them. After it has been excited, not only the Diſh, but the Water alſo, becomes Electrical; and if a ſmall Piece of Thread, or a narrow Slip of thin Paper, or a Piece of Sheet-Braſs, commonly called Tinſel, be held over the Water in an horizontal Poſition, within about an Inch or ſome times more, any of the ſaid Bodies will be attracted to the Surface of the Water, and be repelled, but not ſo often as by Solids. If a pendulous Thread be held at ſome Diſtance from the outſide of the Diſh, it will be attracted and repelled by it many times together with a very quick Motion, but not at ſo great a Diſtance as when the Diſh is empty.

II. *An Experiment ſhewing, that Water is attracted by the Tube, and that the Attraction is attended with ſeveral remarkable and ſurpriſing* Phænomena.

This Experiment being to be made with ſmall Quantities of Water, I at firſt made uſe of ſome of the Braſs Concave little Diſhes in which I formerly ground Microſcopes; but have ſince cauſed to be made a more convenient Apparatus, which conſiſts of a ſmall Pedeſtal of about four Inches and a half long, the Baſe of Ivory about two Inches Diameter. Upon the upper End, as in the larger Stand, there is a Screw, upon

on which is ſcrewed on one of the little Diſhes, which are made of Ivory: Of theſe I have ſeveral Sizes, from three Quarters to one Tenth of an Inch Diameter. When any one of theſe little Veſſels is filled with Water, ſo as that it may ſtand above the Brims of the Cup, and has acquired a Spherical Surface (as it will do in the ſmalleſt Cups) ſet it be ſet on the Table with the little Stand to which it had before been ſcrewed, or, which is better, upon the larger Stand mentioned above, the great Diſh being taken off, and the ſmall plain Top ſcrewed on; being thus prepared, let the Tube be excited, and held over the Water at the Diſtance of about an Inch or more. If it be a large Tube, there will firſt ariſe a little Mountain of Water from the Top of the Drop, of a conical Form, from the Vertex of which there proceeds a Light (very viſible when the Experiment is performed in a dark Room) and a ſnapping Noiſe, almoſt like that when the Fingers are held near the Tube, but not quite ſo loud, and of a more flat Sound: Upon this immediately the Mountain, if I may ſo call it, falls into the reſt of the Water, and puts it into a tremulous and waving Motion. I have now a few Days ſince repeated this Experiment in the Day-time, where the Sun ſhined: I perceived that there were ſmall Particles of Water thrown out of the Top of the Mount, and that ſometimes there would ariſe a very fine Stream of Water from the Vertex of the Cone, in the manner of a Fountain, from which there iſſued a fine Steam, or Vapour, whoſe Particles were ſo ſmall as not to be ſeen; yet it is certain that it muſt be ſo, ſince the under Side of the Tube was wet, as I found when I came to rub the Tube again; and I have ſince found, that though there does not

always

always ariſe that Cylinder of Water, yet there is always a Steam of inviſible Particles thrown on the Tube, and ſometimes to that Degree as to be viſible on it. When ſome of the larger Cups are made uſe of, they are to be filled as high as may be without running over: The Surface will be flat about the middle Part, but when the Tube is held over it, the middle Part will be depreſſed into a Concave, and the Parts towards the Edge be raiſed; and when the Tube is held over againſt the Side of the Water, the little conical Protuberance of Water iſſues out with its Axis horizontally, and after the crackling Noiſe, returns to the reſt of the Water, and ſometimes there will be thrown out of it ſmall Particles of the ſame, as from the ſmaller Portions of Water above mentioned. I am,

SIR,

The Society's, and Your moſt

Charter-Houſe,
Jan. 20. 1731.

Obedient Servant,

STEPHEN GRAY.

III. *The Method of making the beſt* Mortar *at* Madraſs *in* Eaſt India; *deſcribed in a Letter from the Honourable* Iſaac Pyke, *Eſq; Governor of* St. Helena, *to* Edmund Halley, *L. L. D. Reg. Aſtr. Vice-Preſident R. S. and by him communicated to the* Royal Society.

TAKE fifteen Buſhels of freſh Pit-Sand, well ſifted; add thereto fifteen Buſhels of Stone-Lime: Let it be moiſtened or ſlack'd with Water in the common manner, and ſo laid two or three Days together.

Then diſſolve 20 ℔ of *Jaggery*, which is courſe Sugar (or thick Molaſſes) in Water, and ſprinkling this Liquor over the Mortar, beat it up together till all be well mixed and incorporated, and then let it lie by in a Heap.

Then boil a Peck of *Gramm* (which is a Sort of Grain like a *Tare*, or between that and a *Pea*) to a Jelly, and ſtrain it off through a courſe Canvaſs, and preſerve the Liquor that comes from it.

Take alſo a Peck of *Myrabolans*, and boil them likewiſe to a Jelly, preſerving that Water alſo as the other; and if you have a Veſſel large enough, you may put theſe three Waters together; that is, the *Jaggery*-Water, the *Gram*-Water, and the *Mirabolan*. The *Indians* uſually put a ſmall Quantity of fine Lime therein, to keep their Labourers from drinking of it.

The Mortar beat up, and when too dry, ſprinkled with this Liquor, proves extraordinary good for laying Brick or Stone therewith; keeping ſome of the Li-

quor always at Hand for the Workman to wet his Bricks therewith; and if this Liquor prove too thick, dilute it with freſh Water.

Obſerve alſo, that the Mortar here is not only to be well beaten and mixed together, but alſo laid very well, and every Brick, or Piece of Brick, flushed in with the Mortar, and every Cranny filled up, yet not in thick Joints, like the common *Engliſh* Mortar; and alſo over every Courſe of Bricks, ſome to be throwed on very thin: And where the Work hath ſtood, though but for a Breakfaſt or a Dining-time, before you begin again wet it well with this Liquor with a Ladle, and then lay on your freſh Mortar; for this Mortar, notwithſtanding its being thus wetted, dries much ſooner than one not uſed to it would conceive, but eſpecially in hot Weather.

For ſome very ſtrong Work, the ſame Mortar above is improved as follows:

Take courſe Tow and twiſt it looſely into Bands as thick as a Man's Finger (in *England* Ox-Hair is uſed inſtead of this Tow) then cut it into Pieces of about an Inch long, and untwiſt it ſo as to lie looſe; then ſtrew it lightly over the other Mortar, which is at the ſame time to be kept turning over, and ſo this Stuff to be beat into it, keeping Labourers continually beating in a Trough, and mixing it till it be well incorporated with all the Parts of the Mortar. And whereas it will be ſubject to dry very faſt, it muſt be frequently ſoftned with ſome of the aforeſaid Liquor of *Jaggery*, *Gram*, and *Myrabolans*, and ſome freſh Water; and when it is ſo moiſtened, and beat, it will mix well, and with this they build (though it be not uſual to build common Houſe-Walls thus) when the Work

is

is intended to be very ſtrong; as for Inſtance, *Madraſs* Church Steeple, that was building when I was laſt there; and alſo for ſome Ornaments, as Columns, good arched Work, or Imagery ſet up in Gardens, it is thus made.

Though for common Buildings about *Madraſs*, where the Rainy Seaſon holds not above three Months in the Year, and ſometimes leſs, they uſually lay all the common Brick-Work in a loamy Clay, and plaiſter it over on both Sides with this Mortar, which is yet farther to be improved. Thus far for Building-Mortar.

Having your Mortar thus prepared, as is before deſcribed, you muſt ſeparate ſome of it, and to every half Buſhel, you are to take the White of five or ſix Eggs, and four Ounces of *Ghee* (or ordinary unſalted Butter) and a Pint of Butter-Milk, beaten all well together: Mix a little of your Mortar with this, until all your *Ghee*, Whites of Eggs, and Butter-Milk be ſoaked up; then ſoften the reſt well with plain freſh Water, and ſo mix all together, and let it be ground, a Trowel full at a time, on a Stone with a Stone-Roller, in the ſame manner that Chocolate is uſually made, or ground in *England*; and let it ſtand by in a Trough for Uſe. And when you uſe it, in caſe it be too dry, moiſten it with ſome Water, or the before mentioned Liquor. This is the ſecond Coat of Plaiſtering.

Note, When your firſt Coat of Plaiſtering is laid on, let it be well rubbed on with a hardening Trowel, or with a ſmooth Brick, and ſtrewed with a gritty Sand, moiſtened, as Occaſion requires, with Water, or the before-mentioned Liquor, and then well hardened

on again ; which, when half dry, take the laſt mentioned Compoſition for your fine Plaiſtering; and when it is almoſt dry, lay on your Whitening Varniſh ; but if your Work ſhould be quite dry, then your *Chinam* Liquor muſt be waſhed over the Work with a Bruſh.

The beſt Sort of Whitening Varniſh is thus made. Take one Gallon of *Toddy*, a Pint of Butter-Milk, and ſo much fine *Chinam*, or Lime, as ſhall be proper to colour it ; add thereunto ſome of the *Chinam* Liquor before mentioned, waſh it gently over therewith ; and when it is quite dried in, do the ſame again. And a Plaiſter thus made is more durable than ſome ſoft Stone, and holds the Weather better in *India*, than any of the Bricks they make there.

In ſome of the fine *Chinam* that is to endure the Weather, and where it is likely to be ſubject to much Rain, they put * *Gingerly Oil* inſtead of *Ghee* ; and alſo in ſome they boil the Bark of the *Mango*-Tree, and other Barks of aſtringent Natures, and *Aloes*, which grow here in great Plenty by the Sea-ſhore ; but to all of the fine *Chinam*, that is for outſide Plaiſtering, they put Butter-Milk, which is here called *Toyre*. And for inſide Work they uſe Glue made very thin and weak, inſtead of Size, for White-waſhing ; and ſometimes they add a little Gum to it.

N. B. Whereas ſundry Ingredients here mentioned are not to be had in *England*, it may not be amiſs to ſubſtitute ſomething more plentiful here, which I imagine to be of the ſame Nature.

As to all the aſtringent Barks, I take Oaken-Bark to be as good as any.

* Oleum Seſami.

Inſtead

Inſtead of *Aloes*, either *Turpentine*, or the Bark and Branches of the *Sloe*-Tree. Though *Turpentine* be not ſo ſtrong, yet, if uſed in greater Quantity, may ſerve to the ſame Purpoſe.

But there is a Sort of *Aloes Hepatica*, often very cheap. Inſtead of *Mirabolans*, ſome Juice of * *Aloes*; alſo inſtead of *Jaggery*, courſe Sugar, or *Molaſſes*, will do; inſtead of *Toddy*, which is a Sort of *Palm*-Wine, the Liquor from the *Birch*-Tree comes near to it.

Note, That in *China*, and ſome other Parts, they temper their Mortar with Blood of any Sorts of Cattle; but the Ingredients before mentioned are ſaid to be as binding, and do full as well, and does not make the Mortar of ſo dark a Colour as Blood will do.

The Plaiſtering above deſcribed, is thought in *India* vaſtly to exceed any Sort of *Stucco*-Work, or Plaiſter of *Paris*; and I have ſeen a Room done with this Sort of Terraſs-Mortar that has fully come up to the beſt Sort of Wainſcot-Work, in Smoothneſs and in Beauty. I am,

SIR,

Your moſt Obedient Servant,

ISAAC PYKE.

* Sloes.

IV. *Epistola Domini* Huxham, *M. D. ad* Jacobum Jurin, *M. D. R. S. & Coll. Med. Soc. de Morbo Colico singulari.*

VIR quidam Quadragenarius, biliosus, Scorbuticus, inter Optimates Damnonios haud infimus, nuper interiit, Pietatem propter erga Deum, propter universam erga Homines Charitatem, ab omnibus maxime desideratus.

Diu ille multumque Colicis quibusdam Doloribus, inferiorem præcipue Abdominis Regionem infestantibus, laboraverat, Flatu porro perpetuo & molesto. His Biennium circiter, aut Triennium ante mortem, accessêre Dejectiones biliosæ, purulentæ, fœtidissimæ cum strigmentis sæpe mucosis, sæpe sanguineis; ita frequentes insuper, ut persæpe intra tres, quatuorve Horas Alvus vel vicies solveretur, persistente usque Tenesmo: tandem quoque prodiêre Caruncul æ fungosæ, lividæ, tetræ, quarum aliquæ magnitudinis saltem nucis myristicæ. At vero utcunque alvus citissime ægrotum plerumque exercebat; nonnunquam tamen, morbo præsertim ingruente, foret adstricta valde cum horrendo Tormento; nec nisi clystere ducta, aut cathartici irritata responderet. Subinde interea quasi Famelicus oblata quæcunque voraret; subinde ne quidem Delicatula, vel ad Dapes exquisitissimas nauseanti, placerent: Æger autem indies emacuit. Fuit illi urina parcior & semper biliosa: Color vultus luridus, sæpe subflavus.

Tam

Tam dira, tam longa mala infracto admodum fortique plane animo pertulit, donec supervenerunt demum Tumor Pedum Oedematosus, Delirium, Facies *Hippocratica*, sudor frigidus & oleosus, (certa, eheu nimis certa! Mortis Prænuncia.

Varia fuerunt à variis præscripta medicamina, iisque utique in Arte exercitatissimis celeberrimisque Viris; ex Ipecacuana: Scilicet *Emetica*, *Stomachica*, *deobstruentia*, *glutinantia*, *Balsamica*, adstringentia, *Clysmata* multifaria, omnigena; incassum omnia, ni quod Laudanum, ad breve Tempus, foret misero Solamen. Quid Aq. Bristol. & Bathoniensis, Quid Spadana & Pyrmontensis; Quid obstinata, quid accuratissima è Lacte & Vegetabili Diæta potuerint inani omnino opera experiebatur; ut ut per breves aliquot Dies paululum aliquando recreatus videretur.

Sicut Vir optimus, dum viveret, omnibus prodesse alacriter, assidue studebit; sic, vel moriens, se publico devovit Commodo; rogans ubnixe, ut, Cadavere inciso, Causam morbi tam pertinacis, tantam eludentis Artem, perscrutaremur; ut melior forte, detecta nempe Causa, pateret medendi methodus, si quis alius forsan tali corriperetur morbo.

Aperto Abdomine perspeximus Omentum consumptum plane & putridum, Hepar prætumidum & *Schirrosis* Tuberculis, subalbidis, duris, refertum; Vesiculam felleam Bile subnigra semiplenam; totum Duodenum cum vicina Coli Parte eodem Colore perfusum: Pancreas maxime Schirrosum: mediam Ilei Partem ad quinque fere Digitos inflammatam & ferme lividam. Renes erant sani satis, nec Glandulæ mesentericæ æque *Schirrosæ* ac expectassemus.

At

At quod máximè notandum Pars Coli Inteſtini ſuprema, quam Veteres Cæcum nominârunt perperam (cum id potius ejuſdem Appendici, ab iiſdem ita nominatæ, conveniat) in hocce Cadavere non, quod aſſolet, Reni dextro, ſeu potius internæ Peritonæi Laminæ Renem contegenti, adnexa fuit, mediante Appendice vermiculari, ſed in Pelvim delapſa tres circiter infra Tulpii Valvulam Digitos cum ſuperiore Parte Inteſtini recti firmiſſime concreverat: Porro levius adhæſit Peritonæi Tunicæ ſuper Veſicam urinariam expanſæ, ſurſum inde reflexa, faciens cum ſuperiore Inteſtini Parte (ſi ita dicam) angulum valde acutum, ſub cavo dein Hepatis aſcendens & infra Ventriculi Fundum porrecta deſcendebat more ſolito & in Rectum deſinebat. Cum primum autem notavimus ambo Inteſtina & ſupra infraque adhæſionem Gangræna affecta eſſe, ſuſpicantes hic latuiſſe Fundamenta malorum, caute admodum lenteque proceſſimus Scalpello inprimis aperiendo Rectum Inteſtinum, quod ubi factum, vidimus internam Tunicam *Sphacelatam* omnino, nigram quaſi Atramento imbutam & maxime putidam; huic porro adhærentes ſex, ſeptemve Carunculas ſubnigras, fungoſas, quarum minores magnitudine nucem avellanam æquabant. Perſcrutantes ulterius, Ulcus percepimus ex hoc Inteſtino in Colon, ubi cohærebant, penetrans, Digito mediocri facile patens: Inteſtina vero adeo putrida, ut vix Tactum ferrent leviorem. Majorem Coli Partem Excrementis induratis obſervavimus infarctam, etſi plures liquidas Alvi Dejectiones habuit, paulo ante mortem; tenuioribus nempe directe in Inteſtinum rectum per ulceratum orificium tranſeuntibus; ſolidioribus autem in Colo reſtantibus. Veſica urinaria fuit flaccida valde, intuſque muco ſubrufo oblita.

En

En fidam utique, licet minus elegantem morbi Hiſtoriam! En quid inciſo Corpore perſpectum! Ex quibus conjectura haud difficilis, quæ fuit Cauſa morbi: Ex Anatomicis enim notum eſt, quod Concretio Inteſtinorum inter ſe aut cum Peritonæo, motum periſtalticum minuit maxime. Vid. Cowperi Anatomiam Explic. Tab. 34. Unde ad Locum Conglutinationis tarda admodum debiliſque Excrementorum Impulſio, eorundem Congeſtio, Remora ſequentibus; forte duris & acutis lædentibus, qualia Oſſa Prunorum deglutita, aut tale quid; forte acribus & bilioſis Humoribus non ſatis valide motu vermiculari propulſis, ſed ad Angulum Coli acutum ſubſiſtentibus; exinde aut Inteſtini Inflammatio, aut Corroſio, Ulcus denique ſequebantur; tandemque, in Homine valde *Cachectico*, Gangræna.

Plymouth, *Prid. Id. Mart.* 173$\frac{0}{1}$.

V. *De* Figuris *quas* Fluida *rotata induere poſſunt, Problemata duo; cum conjectura de* Stellis *quæ aliquando prodeunt vel deficiunt; & de* Annulo Saturni. *Authore* Petro Ludovico De Maupertuis, *Regiæ Societatis* Londinenſis, *& Academiæ Scientiarum* Pariſienſis *Socio.*

PROBLEMA I.

INVENIRE Figuram Sphæroidis fluidi circa axem rotantis, poſito quod fluidi partes verſus centrum attrahantur ſecundum aliquam diſtantiæ a centro dignitatem.

SOLUTIO. Fig. 1.

Sit P Q axis revolutionis, & P A Q B ſectio Sphæroidis per axem; jam cum partes fluidi inter ſe quieſcant, columnarum unaquæque C D idem habebit pondus verſus C; conſiderando ergo e columnis unam C D quæ efficit cum C P datum angulum cujus ſinus $= b$ pro radio $= 1$, & quæ ex infinitis cylindrulis G g componitur; cylindruli cujuſque pondus verſus C quæro.

Gravitas abſoluta in A cum ſit data & $= p$, pro habenda gravitate in G, erit $p . p' :: CA^n . CG^n$; unde habebitur gravitas in G ſeu $p' = \frac{p . CG^n}{CA^n}$.

Sed cum propter revolutionis motum pars quævis fluidi repellitur vi centrifuga ſecundum G H; & cum in

Fig. 1.

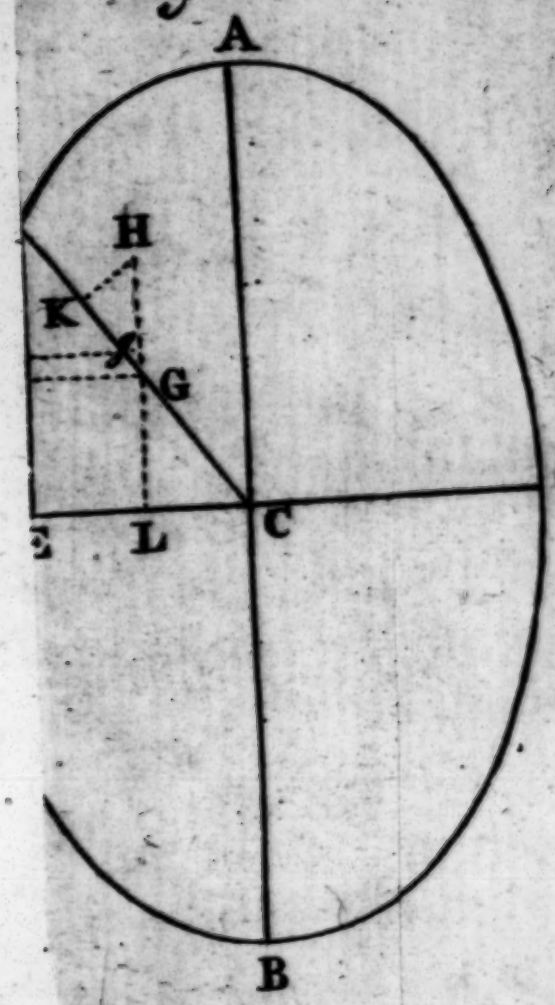
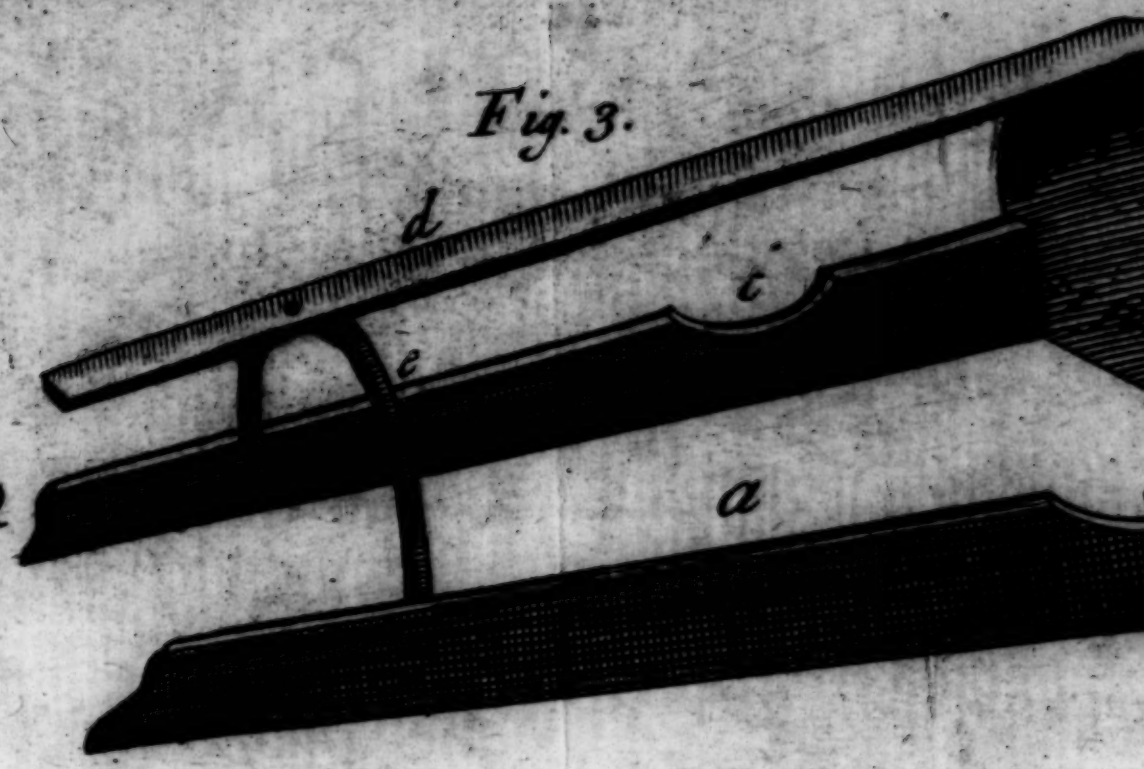


Fig. 3.



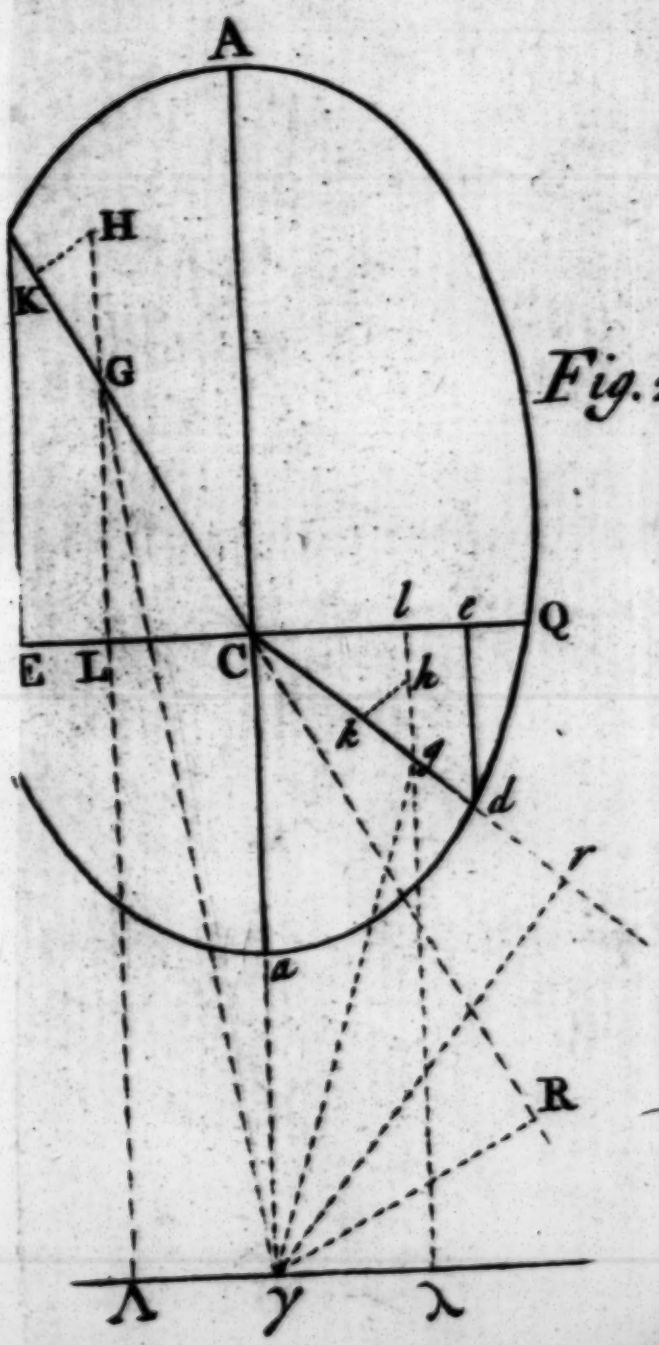


Fig. 2.

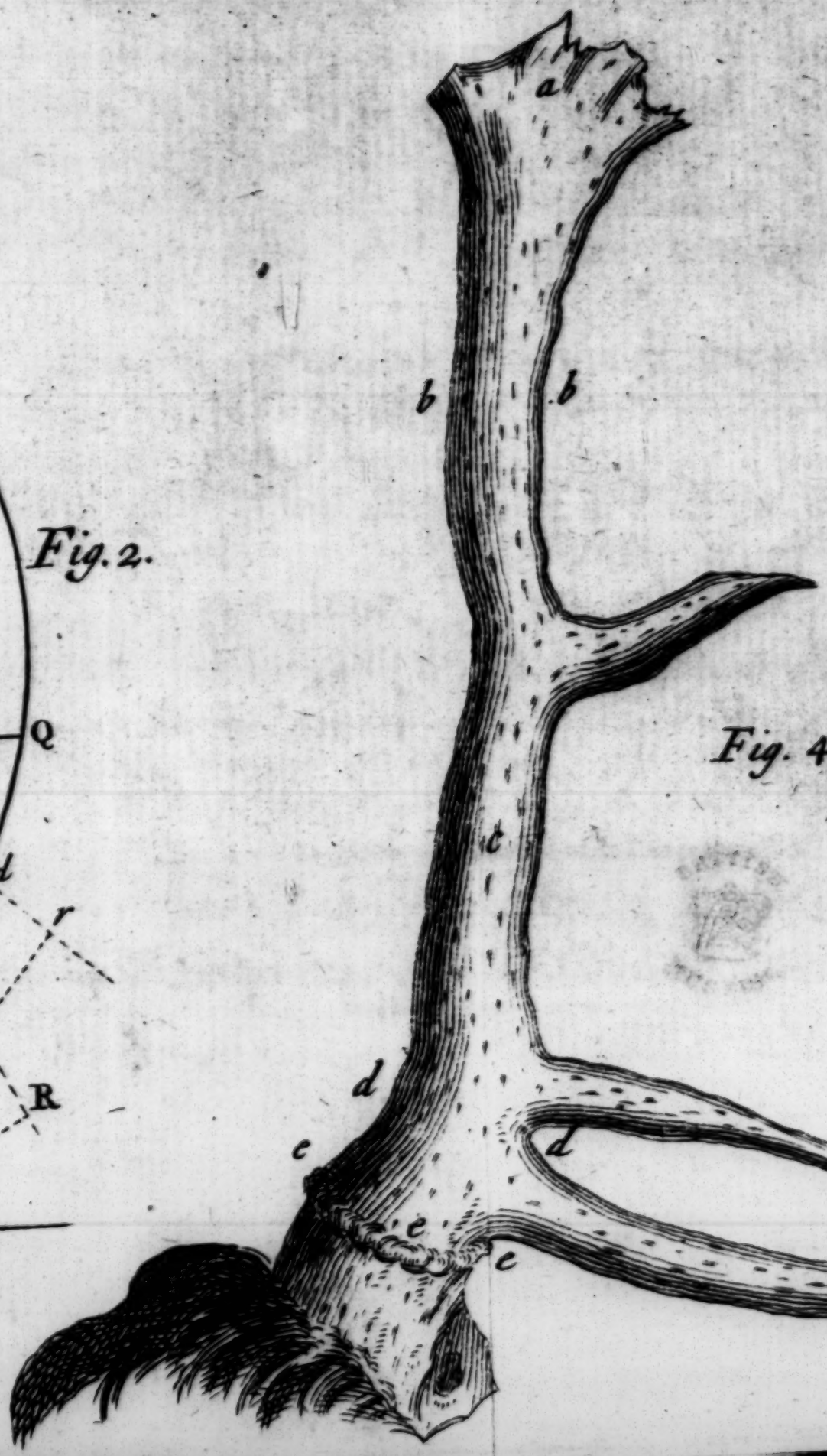


Fig. 4.

P 241 V2.

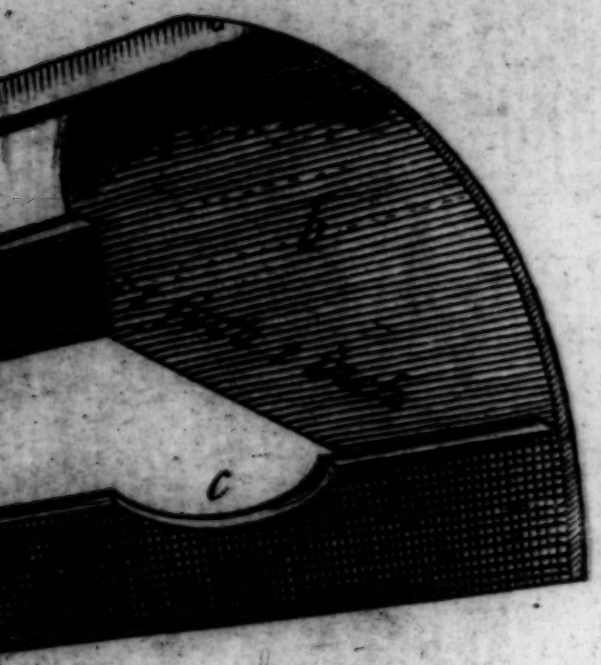


Fig. 4.

J. Mynde ſculp.

in mobilibus quæ contemporaneas circulationes abſolvunt vires centrifugæ ſint ut circulorum deſcriptorum radij ; ſi vis centrifuga in A ſit data & = f, pro habenda vi centrifuga in G, erit $f . f :: CA . LG =$ (ob $LG . CG :: h . 1$) hCG; unde habebitur vis centrifuga in G ſeu $f = \frac{fh . CG}{CA}$: Sed vis hæc cum ſecundum GH agat decomponenda eſt in duas vires KH & GK ex quibus una tantum GK partem aliquam vis ſecundum GC tollit. Habebitur ergo vis illa GK dicendo $GH . GK$ vel $1 . h :: \frac{fh . CG}{CA}$. $f = \frac{fhh . CG}{CA} =$ vi cylindrulum $G\,g$ verſus D trahenti. Vis ergo cylindrulum $G\,g$ verſus C trahens erit tantum $\frac{p . CG^n}{CA^n} - \frac{fhh . CG}{CA}$; & pondus cylindruli verſus C, erit $\left(\frac{p . CG^n}{CA^n} - \frac{fhh . CG}{CA}\right) Gg$. Jam columnæ CG ex cylindrulis iſtis conflatæ pondus erit $\left(\frac{p . CG^n}{CA^n} - \frac{fhh . CG}{CA}\right) G\,g$ quod cum $G\,g$ ſit Elementum ipſius CG, dabit pro pondere columnæ CG, $\frac{p . CG^{n+1}}{n+1 . CA^n} - \frac{fhh CG^2}{2\,CA}$; & pro pondere totius columnæ CD, $\frac{p . CD^{n+1}}{n+1 . CA^n} - \frac{fhh . CD^2}{CA}$, quod efficere debet pondus conſtans A.

Si ergo vocentur $CA = a$, $CD = r$, habebitur $\frac{p\,r^{n+1}}{n+1 . a^n} - \frac{fhhrr}{2a} = A$. Et cum æquatio hæc,

quæcunque ſit h, ſemper obtineat, jam ſi h pro indeterminata ſumatur, æquatio præcedens relationem dabit inter radium quemvis C D & ſinum anguli quem cum axe P Q facit.

Nunc determinanda eſt quantitas conſtans A. Ut æquatio præcedens, ſit ad ſectionem ſphæroidis illius cujus ſemi axis C A $= a$, oportet, quando angulus D C P eſt rectus, vel quando $h = 1$, ſit $r = a$; tunc ergo habetur $\frac{p\,a^{n+1}}{n+1\,.\,a^n} - \frac{f\,a\,a}{2\,a} = A$, vel $A = \left(\frac{2p - nf - f}{2\,.\,n+1}\right) a$.

Et ſic æquatio correcta, erit $\frac{p\,r^{n+1}}{n+1.a^n} - \frac{f\,h\,h\,r\,r}{2\,a}$ $= \left(\frac{2p - nf - f}{2\,.\,n+1}\right) a$ vel $2\,p\,r^{n+1} - (n+1)\,f\,h\,h\,a^{n-1}\,r\,r = (2p - nf - f)\,a^{n+1}$.

Æquatio hæc, omnium ſphæroidum ſectiones determinat quæcunque ſit dignitas diſtantiæ, ſecundum quam fit attractio; unâ tantum excepta hypotheſi in qua attractio foret in ratione ſimplicis diſtantiæ a centro inverſa.

In hoc caſu recurrendum erit ad $\left(\frac{n\,.\,C\,G^n}{C\,A^n} - \frac{f\,h\,h\,.\,C\,G}{C\,A}\right) G\,g$ quod tunc fit $\left(\frac{p\,.\,C\,A}{C\,G} - \frac{f\,h\,h\,.\,C\,G}{C\,A}\right) G\,g$, cujus fluens non niſi per Logarithmos habetur, & prodit $p\,.\,C\,A$ log. $C\,G - \frac{f\,h\,h\,.\,C\,G^2}{2\,C\,A} = A$; vel pro pondere totius columnæ $p\,a$ log. $r - \frac{f\,h\,h\,r\,r}{2\,a} = A$.

Ut

Ut corrigatur hæc æquatio, oportet ut quando $b = 1$, ſit $r = a$; tunc ergo habetur $p\,a \log. a - f\frac{a}{2} = A$; & æquatio correcta, eſt $p\,a \log. r - \frac{f\,b\,b\,r\,r}{2\,a} = p\,a \log. a - \frac{f\,a}{1\,2}$; vel $2\,p\,a \log\left(\frac{r}{a}\right) = \frac{f\,b\,b\,r\,r}{a} - f\,a$; vel tranſeundo ad numeros & ſumendo $c =$ numero cujus log. $= 1$, habetur $r = a\,c^{\left(\frac{f\,b\,b\,r\,r}{2\,p\,a\,a} - \frac{f}{2\,p}\right)}$.

Patet meridianos ſphæroidum ſemper prodire curvas algebraicas excepta tantum iſta hac hypotheſi.

Si harum omnium curvarum deſideretur aequatio more ſolito per coordinatas rectangulas, facile haberetur. Nam faciendo $C\,E = x$, & $D\,E = y$, erit $r\,r = x\,x + y\,y$, & $b\,r = y$. Exterminando ergo b & r ex æquatione generali, invenietur $2\,p\,(x\,x + y\,y)^{\frac{n+1}{2}} - (n+1)\,f\,a^{n-1}\,y\,y = (2\,p - n\,f - f)\,a^{n+1}$. Et in caſu $n = -1$; $x\,x + y\,y = a\,a\,c^{\left(\frac{f\,y\,y}{p\,a\,a} - \frac{f}{p}\right)}$.

Sed prima noſtra ratio definiendi curvas per radios & angulos æque, & forſan hic magis commoda eſt quam illa quæ definit curvas per coordinatas.

Quamvis b, ut variabilis tractatur, tamen non ultra certos limites variat, & hi limites ſunt 0 & 1; noſtra itaque æquatio radialis non definit niſi partem curvæ cujus amplitudo eſt angulus rectus; ſed cum curvæ iſtæ ex quatuor arcubus ſimilibus & æqualibus conſtent,

conſtent, dantur curvæ meridianorum integræ per æquationem noſtram.

Jam facile determinatur ratio inter ambos Sectionis axes in quavis Hypotheſi.

Cum æquatio generalis ſit $2\,p\,r^{n+1} - (n+1)\,f\,h\,h\,a^{n-1}\,r\,r = (2\,p - n\,f - f)\,a^{n+1}$; ut inveniatur r quando $h = o$, habetur $2\,p\,r^{n+1} = (2\,p - n\,f - f)\,a^{n+1}$. Ex quo elicitur $CA . CP :: (2p)^{\frac{1}{n+1}} . (2p - nf - f)^{\frac{1}{n+1}}$.

Et in Hypotheſi gravitatis ſimplici diſtantiæ reciproce proportionalis, habetur $\text{Log.}\left(\frac{r}{a}\right) = -\frac{f}{2p}$.

Ex quo elicitur $\text{Log. } CA - \text{Log. } CP = \frac{f}{2p}$.

Patet quod n exiſtente numero affirmativo, integro, ſeu fracto, hoc eſt in omnibus hypotheſibus gravitatis directe proportionalis alicui diſtantiæ dignitati, diameter æquatoris axe revolutionis major ſemper erit. Sed ſi ſit n numerus aliquis negativus, hoc eſt, ſi gravitas proportionalis ſit inverſe alicui dignitati diſtantiæ, habebitur $CA . CP :: (2p)^{\frac{1}{-n+1}} . (2p + nf - f)^{\frac{1}{-n+1}}$; nunc ſi $n < 1$, ſit $k = 1 - n$; & habebitur $CA . CP :: (2p)^{\frac{1}{k}} . (2p - kf)^{\frac{1}{k}}$; & ſi $n > 1$, ſit $n - 1 = k$; & habebitur $CA . CP :: (2p)^{\frac{1}{-k}} . (2p + kf)^{\frac{1}{-k}}$, vel $CA . CP :: (2p + kf)^{\frac{1}{k}} . (2p)^{\frac{1}{k}}$. Inſuper invenimus quod n exiſtente $= -1$, habe-

habetur Log. C A — Log. C P = $\frac{f}{2p}$. Ex quibus patet nullam esse hypothesin in qua diameter æquatoris non superet meridiani diametrum.

Sphæroidum figura, ut satis apparet, a ratione, quam habet vis centrifuga ad gravitatem, dependet. Nunc, qualis esse possit in quibusdam hypothesibus ista ratio, videamus, & quæ inde figura sphæroidibus eveniet.

Si gravitas uniformis supponatur, erit $n = 0$ & habebitur C A . C P :: $2p . 2p - f$. Itaque in terra ubi vis centrifuga sub æquatore 289^{am} gravitatis partem æquat, si quæratur ratio quam habet diameter æquatoris ad axem in hypothesi gravitatis uniformis (ponendo 289 pro p, & 1 pro f) habebitur C A . C P :: 578. 577.

Posset vis centrifuga æquari gravitati, quod obtineret si terræ revolutio diurna 17 vicibus celerior redderetur; & tunc haberetur C A . C P :: 2 . 1. Sed si revolutio magis ac magis cita fieret, partes successive dissiparentur donec tandem terra ad atomum unicam redigeretur. Ex quo patet quod in hac hypothesi gravitatis uniformis, terra circa polos numquam potest esse depressior quam si diameter æquatoris sit duplo major axe revolutionis. In hoc casu terra constaret ex duobus paraboloidibus sicut invenit D. Huygens *in tractatu de causa gravitatis* pro hac hypothesi particulari quam solam examinavit.

Si gravitas distantiæ a centro proportionalis statuatur, erit $n = 1$, & habebitur C A . C P :: $\sqrt{p} . \sqrt{(p - f)}$. Si igitur vis centrifuga, gravitati fieret æqualis, diameter æquatoris, axe revolutionis fieret infinite major. Hoc est, sphæroides planum tantum circulare foret.

Et

Et cum in hac hypotheſi vis centrifuga ad gravitatem omnes poſſit habere rationes à ratione nullâ, uſque ad æqualitatis rationem, patet æquatoris diametrum ad axem revolutionis omnes has rationes habere poſſe ; & ſphæroidem quæ in hac hypotheſi, ſemper eſt Ellypſois, poſſe eſſe omnes Ellypſoides à ſphæra uſque ad circulum. Sed in hac etiam hypotheſi, vis centrifuga ultra creſcere nequit.

Si gravitas quadrato diſtantiæ reciproce proportionalis ponatur, erit $n = -2$; & habebitur $CA.CP :: 2p + f.2p$. Ex quo liquet in hac hypotheſi vim centrifugam ſemper creſcere poſſe, vel quod eodem redit, motum revolutionis citiorem ſemper fieri poſſe, nec tamen ſphæroidis partes diſſiparentur.

SCHOLION.

Cæterum, ex his omnibus hypotheſibus nullam quaſi in natura revera datam hic uſurpo : ſiquidem interiores corporum partes non gravitant verſus centrum aliquod unicum juxta proportionem quamvis diſtantiarum ab hoc centro in corporibus poſito. Attractio partium ex forma corporis dependet, ut & viciſſim forma dependet ex attractione. Idcirco omnes hæ determinationes, ſunt magis mathematicæ quam phyſicæ. Unde fit, quod D. Newton indeterminatione axis terræ & diametri æquatoris rationem invenerit diverſam ab Huygeniana & a noſtris, nempe eam quæ eſt inter 229 & 230. Summus vir ſolutionem mere geometricam per hypotheſes neglexit, ut naturæ magis conſentaneam daret.

PROBLEMA II.

Posito quod materia fluens circa axem extra fluentum sumtum, attrahatur versus centrum in hoc axe positum vi alicui distantiæ a centro dignitati proportionali; dum interea propter fluenti partium attractionem mutuam, fit altera attractio versus aliud centrum intra fluentum sumtum, quæ in quavis sectione fluenti revolutionis perpendiculariter per centrum exterius facta, sit alicui distantiæ a centro interiori dignitati proportionalis: invenire figuram quam fluentum induet.

SOLUTIO. (*Fig.* 2.)

Sit A D P *ad* Q A sectio fluenti gyrantis circa axem Λ λ per planum revolutioni rectum quod transit per centrum γ facta. Sit γ centrum virium centripetarum extra fluentum sumtum; & C centrum versus quod partes fluenti attrahuntur in sectione sumtum.

Ut fluidi partes in æquilibrio maneant, oportet pondus cujusque columnæ C D tum a gravitate versus γ, tum versus C, tum a vi centrifuga ortum, idem ubique maneat.

Sit ergo gravitas in A versus γ, data & = π, gravitas in A versus C, data & = *p*, & vis centrifuga in A, etiam data & = *f*. Sit A C = *a*, C γ = *b*, *c g* = *r*; sinus ang. D C P = *b* pro radio = 1; erit G L = *b r*, & è γ demissa perpendiculari γ R in radium C D productum, erit C R = *b b*, & γ G = (per 12^am^ Elem. lib. 2.) $\sqrt{(bb + 2bbr + rr)}$.

Jam cum ſit gravitas in A verſus $\gamma = \pi$; dicendo $\pi . \pi' :: (a+b)^{m} (bb+2bhr+rr)^{\frac{1}{2}m}$ habebitur gravitas in G ſeu $\pi' = \frac{\pi (bb+2bhr+rr)^{\frac{1}{2}m}}{(a+b)^{m}}$.

Et ut verſus C derivetur, dicatur $\pi . \pi' :: G\gamma . GR$, vel $\frac{\pi (bb+2bhr+rr)^{\frac{1}{2}m}}{(a+b)^{m}} . \pi'' :: (bb+2bhr+rr)^{\frac{1}{2}} . bh+r$; unde habetur vis ab attractione verſus γ, derivata verſus C, ſeu

$$\pi'' = \frac{\pi (bh+r) (bb+2bhr+rr)^{\frac{m-1}{2}}}{(a+b)^{m}}.$$

Habetur inſuper (cum gravitas in A verſus C, ſit $= p$) gravitas in G verſus C $= \frac{p r^{n}}{a^{n}}$; Gravitas ergo tota verſus C ex gravitatibus ambabus verſus γ & C orta habebitur $= \frac{\pi . (bh+r)(bb+2bhr+rr)^{\frac{m-1}{2}}}{(a+b)^{m}} + \frac{p r^{n}}{a^{n}}$;

Nunc cum ſit vis centrifuga in A, $= f$; dicendo $f . f' :: a+b . b+hr$ habetur vis centrifuga in G ſeu $f' = \frac{f(b+hr)}{a+b}$; & ut pars iſtius vis quæ verſus D trahit inveniatur; fiat $f' . f'' :: GH . GK$, vel $\frac{f(b+hr)}{a+b} . f'' :: 1 . h$; unde habetur vis gravitati verſus C oppoſita ſeu $f'' = \frac{fh(b+hr)}{a+b}$. Vis

Vis ergo versus C ex omnibus his viribus resultans, erit $\frac{\pi (bb+r)\,(bb+2bhr+rr)^{\frac{m-1}{2}}}{(a+b)^m} + \frac{pr^n}{a^n} - \frac{fh(b+hr)}{a+b}$.

Concipiendo ergo ut in primo problemate columnam C D, ex infinitis cylindrulis r compositam, habebitur $F\left(\frac{\pi (bb+r)\,(bb+2bhr+rr)^{\frac{m-1}{2}}}{(a+b)^m} + \frac{pr^n}{a^n} - \frac{fh(b+hr)}{a+b}\right)r$, quod æquari debet alicui constanti ponderi. Erit ergo $\frac{\pi (bb+2bhr+rr)^{\frac{m+1}{2}}}{m+1.\,(a+b)^m} + \frac{pr^{n+1}}{(n+1).\,a^n} - \frac{fbhr}{a+b} - \frac{fbhrr}{2.(a+b)} = A$.

Ut corrigatur hæc æquatio, oportet quando $h = 1$, esse $r = a$; tunc ergo habetur $\frac{\pi (a+b)}{m+1} + \frac{pa}{n+1} - \frac{fab}{a+b} - \frac{faa}{2(a+b)} = A$. Et æquatio corecta, erit $\frac{\pi (bb+2bhr+rr)^{\frac{m+1}{2}}}{(m+1).\,(a+b)^m} + \frac{pr^{n+1}}{(n+1)\,a^n} - \frac{fbhr}{a+b} - \frac{fbhrr}{2(a+b)} = \frac{\pi (a+b)}{m+1} + \frac{pa}{n+1} - \frac{fab}{(a+b)} - \frac{faa}{2(a+b)}$.

Vel ſcribendo c pro $a+b$, & q pro $(m+1)\times(n+1)\,2\,(n+1)\,\pi\,a^n\,(bb+2bhr+rr)^{\frac{m+1}{2}}+2\,(m+1)\,p\,c^m\,r^{n+1}-2\,q\,f\,a^n\,b\,c^{m-1}\,h\,r-q\,f\,a^n\,c^{m-1}\,h\,h\,r\,r=2\,(n+1)\,\pi\,a^n\,c^{m+1}+2\,(m+1)\,p\,a^{n+1}\,c^m-2\,q\,f\,a^{n+1}\,b\,c^{m-1}-q\,f\,a^{n+2}\,c^{m-1}$.

Patet, in omnibus hypotheſibus, ſectionem fluenti eſſe curvam algebraicam, exceptis tantum hypotheſibus attractionis verſus γ vel verſus C in ratione ſimplicis diſtantiæ inverſâ; nam ſi ſit tantum $m=-1$, habebitur pro ſectione fluenti

$$\frac{\pi\,(a+b)}{2}\,\mathrm{L}\,(bb+2bhr+rr)+\frac{p\,r^{n+1}}{n+1.\,a^n}-\frac{f\,b\,h\,r}{a+b}-\frac{f\,h\,h\,r\,r}{2\,(a+b)}=\frac{\pi\,(a+b)}{2}\,\mathrm{L}\,(a+b)^2+\frac{p\,a}{n+1}-\frac{f\,a\,b}{a+b}-\frac{f\,a\,a}{2\,(a+b)}.\text{ vel}$$

$$\frac{\pi\,c}{2}\,\mathrm{L}\left(\frac{bb+2bhr+rr}{cc}\right)=-\frac{p\,r^{n+1}}{(n+1)\,a^n}+\frac{f\,b\,h\,r}{c}+\frac{f\,h\,h\,r\,r}{2\,c}+\frac{p\,a}{n+1}-\frac{f\,a\,b}{c}-\frac{f\,a\,a}{2\,c}.$$

Et ſi tantum $n=-1$, habebitur

$$\frac{\pi\,(bb+2bhr+rr)^{\frac{m+1}{2}}}{m+1.\,(a+b)^m}+p\,a\,\mathrm{L}\,r-\frac{f\,b\,h\,r}{a+b}-\frac{f\,h\,h\,r\,r}{2\,(a+b)}=\frac{\pi\,(a+b)}{m+1}+p\,a\,\mathrm{L}\,a-\frac{f\,a\,b}{a+b}-\frac{f\,a\,a}{2\,(a+b)}.\text{ vel}\;p\,a\,\mathrm{L}\left(\frac{r}{a}\right)=-$$

$\pi\,(bb$

$$\frac{\pi (bb+2bhr+rr)^{\frac{m+1}{2}}}{(m+1)c^m} + \frac{fbhr}{c} + \frac{fbhrr}{2c} + \frac{\pi c}{m+1} - \frac{fab}{c} - \frac{faa}{2c}.$$

Sed ſi ſint ſimul $m = -1$, & $n = -1$, habebitur

$$\frac{\pi (a+b)}{2} \mathrm{L}\,(bb+2bhr+rr) + p\,a\,\mathrm{L}\,r - \frac{fbhr}{a+b} - \frac{fbhrr}{2(a+b)} = \frac{\pi(a+b)}{2} \mathrm{L}\,(a+b)^2 + p\,a\,\mathrm{L}\,a - \frac{fab}{a+b} - \frac{faa}{2(a+b)}.$$ vel

$$\frac{\pi c}{2} \mathrm{L}\left(\frac{bb+2bhr+rr}{cc}\right) + p\,a\,\mathrm{L}\left(\frac{r}{a}\right) = \frac{fbhr}{c} + \frac{fbhrr}{2c} - \frac{fab}{c} - \frac{faa}{2c}.$$

Si deſideretur æquatio ſectionis fluenti per coordinatas rectangulas; faciendo C E $= x$ & D E $= y$ habebuntur duæ æquationes $rr = xx + yy$ & $hr = y$, quarum ope exterminabuntur r & h ex æquationibus ſupra inventis; & habebitur pro caſu generali,

$$2(n+1)\pi a^n (bb+2by+yy+xx)^{\frac{m+1}{2}} + 2(m+1)p c^m (xx+yy)^{\frac{n+1}{n}} - 2qf a^n b c^{m-1} y - qf a^n c^{m-1} yy = 2(n+1)\pi a^n c^{m+1} + 2(m+1)p a^{n+1} c^m - 2qf a^{n+1} b c^{m-1} - qf a^{n+2} c^{m-1}.$$

Et eodem modo in caſibus $m = -1$, $n = -1$, reperientur æquationes per coordinatas rectangulas.

Ut

Ut curvam P A Q invenimus, ita quoque invenietur curva P *a* Q mutatis mutandis. Nam tunc si sit gravitas in *a* versus γ data & $= \pi$, gravitas in *a* versus C $= p$, vis centrifuga in $a = f$; C $a = a$, C $\gamma = b$, C $g = r$, $g\,l = hr$, & $\gamma\,g = \sqrt{(bb - 2bhr + rr)}$ invenietur gravitas in *g* versus C, ab attractione versus γ orta, $\pi'' = \frac{\pi (bh - r)\,(bb - 2bhr + rr)^{\frac{m-1}{2}}}{(b-a)^m}$.

Habetur insuper gravitas in *g* versus C, $p' = \frac{p\,r^n}{a^n}$,

Sic etiam vis centrifugæ pars in *g* quæ trahit versus C invenietur $f'' = \frac{f\,h\,(b - hr)}{b-a}$.

Sed hæ posteriores vires nunc primæ opponuntur.

Habebitur ergo $\mathbf{F}\left(\frac{\pi(-bh+r)\,(bb-2bhr+rr)^{\frac{m-1}{2}}}{(b-a)^m} + \frac{p\,r^n}{a^n} + \frac{f\,h\,(b-hr)}{b-a}\right)\dot{r} = \mathbf{A}$. Unde deducitur

$$\frac{\pi\,(bb - 2bhr + rr)^{\frac{m+1}{2}}}{(m+1)\,(b-a)^m} + \frac{p\,r^{n+1}}{(m+1)\,a^n} + \frac{f\,bhr}{b-a} - \frac{f\,h\,h\,r\,r}{2\,(b-a)} = \frac{\pi\,(b-a)}{m+1} + \frac{p\,a}{n+1} + \frac{f\,a\,b}{b-a} - \frac{f\,a\,a}{2\,(b-a)}.$$

Et in casibus $m = -1$, $n = -1$, invenientur ut supra æquationes sectionum, debitis tantum signis mutatis.

Et per has æquationes radiales invenientur æquationes ad coordinatas ut factum est pro curva P A Q.

Et cum pondus columnæ tam in superiori quam in inferiori curva debeat idem esse, habebitur æquatio inter pondus A in curva superiori, & pondus A in

infe-

inferiori, ex qua determinabitur C *a* pro determinata C A, & ſic ſectio fluenti integra determinabitur.

Quæcunque ſit hypotheſis gravitatis, ſemper pro dato angulo D C P, radius C D obtineri poteſt datæ longitudinis, & ſic figura fluenti vel craſſior vel tenuior fiet, & quidem modis infinitis; ponendo in æquatione pro b & r valores determinatos. Sic fieri poteſt ut puncta P & Q coeant, ſcribendo o pro b & r; & tunc ſectio fluenti ex duabus ovalibus figuris in C junctis conſtabit. Nam infinitæ rationes inter π, p, & f quæ ad id efficiendum conveniunt, obtinebuntur.

Si ex.grat.ultimum hoc deſideretur,nempe ut P & Q coeant in C, habebitur $2(n+1)\pi b^{m+1} = 2(n+1)\pi c^{m+1} + 2(m+1)pac^{m} - 2qfabc^{m-1} - qfaac^{m-1}$. Unde eliciuntur infinitæ rationes inter π, p, & f.

Si ponatur gravitas tum verſus γ, tum verſus C ſimplici diſtantiæ a centro proportionalis; ſectio fluenti erit coniſectio. Et ſi tunc deſideretur ut puncta P, Q & C coeant, figura ex duabus Ellypſibus in C junctis, conſtabit.

Nunc ſi diſtantia C γ evaneſcat, vel duo centra coeant; erit $b=o$ & $e=a$; & fluentum fiet ſphærois.

Si inſuper ponatur $m=n$, & $\pi=o$, æquatio generalis ſectionis fluenti fiet $2pr^{n+1} - (n+1)fa^{n-1}bbrr = (2p-nf-f)a^{n+1}$. Vel in caſu $n=-1$, $2pa\mathrm{L}\left(\frac{r}{a}\right) = \frac{fbbrr}{a} - fa$.

ut invenimus in primo problemate quod eſt iſtius caſus tantum ſpecialis.

SCHO-

SCHOLION.

Hæc conſideratio formarum quas pro diverſa gravitatis ad vim centrifugam ratione, fluida induere poſſunt, me induxit ut cogitarem tales planetarum formas forſitan in cœlis reperiri, cum ad hoc celeriori tantum circa axem motú, vel minori materiæ denſitate opus ſit. Etenim quamvis pauci quos novimus planetæ ſatis ad ſphæroidicam formam accedant, cur non alij aliarum formarum ſupra dictarum admitterentur vel circa alios ſoles, vel etiam circa noſtrum? Hi planetæ lentiformes, vel propter diſtantiam, a nobis nunquam conſpicerentur, vel quia in plano Eclipticæ verſarentur, aut in plano parum ad Eclipticam inclinato, cui plano illorum axis revolutionis eſſet rectus, aut fere rectus; nam in hoc ſitu è terra conſpici nequirent.

Cur etiam talis formarum varietas inter fixas, locum non haberet? præſertim cum illas circa axem gyrari, ſolis inſtar noſtri, ſit admodum veriſimile. Forſitan fixæ lentiformes in cœlis dantur. Forſitan planetis admodum excentricis vel cometis cinguntur, qui cum in plano æquatoris fixæ non verſentur, quando ad perihelium accedunt, directionem axis ſtellæ turbant; & tunc quæ nobis propter ſitum non apparebat, apparet ſtella, vel quæ apparebat non apparet. Et ſic ratio redderetur cur quædam ſtellæ per vices accendi & extingui videntur.

Sed ſi in quovis ſyſtemate cometa aliquis caudam trahens, fertur in viciniam alicujus potentis planetæ, quid eventurum? Materia quæ à corpore cometæ effluit, circa planetam trahetur; & cometa novam

mate-

materiam effundente, vel ſufficiente materiæ jam effuſæ copia, orietur fluxus circa planetam continuus: & quamvis columnæ fluenti vel cylindrica, vel conica, vel quælibet alia forma primùm fuerit, vis ejus centrifuga cum gravitatibus tum a planeta tum a materia fluenti ortis, ſemper eam latiorem & tenuiorem reddet; & columna hæc curvata ad aliquam e formis ſupra definitis in Probl. 2° accedet. Et ſic omnium naturæ phænomenorum maxime ſtupendi, Saturni annuli ratio redderetur.

Interea dum cometæ cauda talem planetæ annulum daret, corpus ipſum cometæ forſan etiam traheretur ſi in diſtantia debita eſſet, & novus planetæ ſatelles fieret. Sic forſan plures cometæ ſatellitibus & annulo Saturnum ditarunt: nam annulum Saturni unius cometæ effluvio tribuendum non videtur, cum umbram in Saturni diſcum projiciat dum materia tamen caudarum cometarum adeo ſit rara ut trans illam lucentes ſtellæ videri queant. Annulus ergo Saturni ex plurium cometarum caudis conſtare videtur, & quarum materia propter attractionem Saturni denſior facta eſt.

Patet planetam ſatellites, nec tamen annulum, acquirere poſſe; nam non omnes cometæ caudam habent: Et ſi cometa caudâ carens trahatur, planetæ ſatellitem ſine annulo dabit.

Summus Newton ſtatuit vapores cometarum in planetas ſpargi: imò etiam hanc communicationem neceſſariam duxit, ut quidquid liquoris conſumitur, reparetur. Viri illuſtriſſimi D.D. Halley & Whiſton, cometas & cometarum caudas planetis infeſtas mutationes, ut polorum variationem, diluvia, & incendia inferre poſſe crediderunt; ſed cometæ benigniores ef-

fectus producere poſſunt, & etiam planetis aliquando res miras & utiles dare.

VI. *An Extract of a Letter from* Oliver St. John, *Eſq; F. R. S. dated from* Florence, November *the* 30*th*, 1731, N. S. *Communicated by* R. Graham, *F. R. S.*

WHEN I conſider how many are charged overlaid in the Bills of Mortality, I wonder that the *Arcutio's*, univerſally uſed here, are not uſed in *England*. I here ſend you the Deſign of one, drawn in Perſpective, with the Dimenſions, which are larger than uſual.

The Arcuccio. *Vide Fig.* 3.

a, The Place where the Child lies.

b, The Head-board.

c, The Hollows for the Nurſes Breaſts.

d, A Bar of Wood to lean on when ſhe ſuckles the Child.

e, A ſmall Iron Arch to ſupport the ſaid Bar.

The Length 3 Feet, 2 Inches and a half.

Every Nurſe in *Florence* is obliged to lay the Child in it, under Pain of Excommunication. The *Arcutio*, with the Child in it, may be ſafely laid entirely under the Bed-cloaths in the Winter, without Danger of ſmothering.

VII. *An*

VII. *An Extract of a Letter from Mr.* Hopkins *to Mr.* John Senex, *F. R. S. concerning an extraordinary large* Horn *of the Stag Kind, taken out of the Sea on the Coaſt of* Lancaſhire.

INCLOSED is a Sketch of an Horn, which I thought of an extraordinary Size, the Dimenſions whereof are exactly ſet down, as I took them myſelf, by laying a String along the Surface. *Vid. Fig.* 4.

Part of the left Horn of a Stag.

a e the Length 30 Inches.

b b the Circumference above the third Branch, 7 Inches.

c the Circumference above the ſecond Branch, 8 Inches.

d d the Circumference between the Brow and ſecond Antler, 11 Inches.

e e the Circumference 10 Inches.

d e the Circumference of the Brow-Antler, 6¾ Inches.

e f the Length of the Antler, 16¾ Inches.

This Horn was drawn out of *Raven's Barrow Hole*, adjoining to *Holker Old Park*, by the Net of a Fiſherman, on the 20th of *June*, 1727. The Tide flows conſtantly where it was found, and the Land is very high near it.

This Horn is now in the Poſſeſſion of Sir *Thomas Lowther*, Bart. of *Holker*, in *Cartmell* in *Lancaſhire*.

SIR, Your Humble Servant,

J. HOPKINS.

Several Horns of this Kind, and extraordinary Size, have been frequently dug up in Bogs in Ireland, *but I never met with an Account of any being found in the Sea before. I ſhall refer the Curious to the Account of the large Horns found under Ground in* Ireland, *communicated to the* Royal Society *by Sir* Thomas Molyneux, *M. D. F. R. S. which is printed in theſe Tranſactions, Numb.* 227, *p.* 489, &c. *and to the Deſcription of the Mooſe Deer by the Honourable* Paul Dudley, *Eſq; F. R. S. Numb.* 368, *p.* 165, &c.

VIII. *Three Caſes communicated by* Claudius Amyand, *Eſq; F. R. S. Serjeant Surgeon to his Majeſty.*

I. *Concerning a Child born with the Bowels hanging out of the Belly.*

II. *Of an extraordinary Cauſe of a Suppreſſion of Urine in a Woman.*

III. *Of a Stricture in the middle of the Stomach in a Girl, dividing it into two Bags.*

I. THE 18th of *December*, 1730, Mr. *L*——'s Child was born with the greateſt Part of the Bowels hanging out of the Belly, by an Aperture about half an Inch in Diameter on the Right Side of the Navel String. The Birth was natural and eaſy.

Being called, I found the Aperture lined with a Skin, and a Ligament that oppoſed the Reduction; the

the Parts livid, and tending to Mortification; yet the Child lived near three Days.

Upon opening, I found the *Prolapſus* to conſiſt of all the ſmall Guts, except the *Duodenum*, and of all the large ones, except of a ſmall Portion of the *Rectum*; the Gaul-Bladder was about two Inches long, one half of which ſtood out of the *Abdomen*, and a ſmall Portion of the *Stomach*: All theſe were ſo coaleſced together, and confounded, that it was impoſſible to ſeparate them; though upon blowing, the Inteſtinal Pipe ſeemed to have its uſual Length. The *Liver* was much thicker and larger than uſual, and convex in that Part of it, that is naturally concave: And the *Uterus* and *Bladder* preſſed on the left Side, by the Weight of the Bowels preſſing on the Right.

The Mother could aſcribe no Cauſe for this præternatural Formation. The Child came at full Term, but its Inquietudes for ſome Months before the Birth, made the Mother apprehend he was not well. Saving this, nothing extraordinary appeared.

II. I was lately called to a Woman who had a Suppreſſion of *Urine*, occaſioned by the *Menſes* collected in the *Vagina*, preſſing upon the *Urethra*. She had been delivered eight Months before of two Children; after which the *Caruncuiæ Myrtiformes* had joined together ſo cloſely, that there was no room for any Evacuation of the *Menſes*. I made a croſs Aperture, whereby near three Quarts of the *Menſes* collected were diſcharged; the Suppreſſion of *Urine* was immediately removed, and the Patient cured.

III. Upon

III. Upon opening the Body of a young Country Girl, dead of a Conſumption, I found her Lungs ſuppurated in many Places, and a *Stricture* in the middle of the Stomach, dividing this *Viſcus* into two Bags. This Stricture appeared to have been of ſome Standing, and likely to have occaſioned ſome Difficulty in Digeſtion; but upon Enquiry, her Miſtreſs and Fellow Servants ſaid, that her Appetite and Digeſtions were natural, and that ſhe had continued in a good Plight, till upon coming to *London* ſhe contracted a Cough, that had brought on the Conſumption.

FINIS.

ADDENDA Page 230.

THE laſt Experiment was repeated with hot Water; when the Water was attracted much ſtronger, and at a much greater Diſtance: The Steam ariſing from the Vertex was in this Caſe viſible, and the Tube was ſprinkled with large Drops of Water. I tried the Experiment in the ſame Manner upon Quickſilver, which was likewiſe raiſed up; but by reaſon of its great Weight, not to ſo great an Height as the Water: The ſnapping Noiſe was louder, and laſted much longer than in the Water.

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PHILOSOPHICAL TRANSACTIONS

For the Months of *April*, *May*, and *June*, 1732.

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II. *The Description of a new* Quadrant *for taking* Altitudes *without an Horizon, either at Sea or Land. Invented by Mr.* John Elton.

III. *A remarkable Case of a Gentlewoman who died of a* Hydrops Ovarii, *in the Thirty-third Year of her Age, after having been tapped Fifty-seven times. By Mr.* John Belchier, *Surgeon.*

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VI. *An Abſtract of a Letter, written in* Dutch, *to the Illuſtrious* Royal Society *of* London, *by* Arnold Marcel, (*Nephew to the late Mr.* Anthony van Leeuwenhoek, *F. R. S.*) *Communicated by the Rev^d. Dr.* J. T. Deſaguliers, *F. R. S.*

Jos: Banks

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MDCCXXXII.

I. *An Abſtract of the* Meteorological Diaries *communicated to the* Royal Society, *with Remarks upon them by* W. Derham, *D. D. Canon of* Windſor, *and F. R. S.*

PART I. Containing Meteorological Obſervations made at *Coventry*, *Upminſter*, 1707. | *New-England*, *Upminſter*, 1715, 1716.

A TABLE ſhewing the Height of the *Mercury* in the Barometer, the Coaſt and Strength of the Winds, and the Weather, on the firſt Day of eight Months in the Years 1707 and 170$\frac{7}{8}$. Obſerved at *Coventry* in *Warwickſhire* by Mr. *H. Beighton*, F. R. S. and at *Upminſter* in *Eſſex*, by *W. Derham*, F. R. S.

	COVENTRY				UPMINSTER.			
Month.	Barom. Inc.	Barom. Dec.	Winds.	Weather.	Barom. Inc. Cent.	Winds.	Clouds.	Weather.
July.	29.	2	S 2	Cloudy with Sunſhine.	29. 39	S 2	S W	Showers and Stormy.
		25	S W 3		36	W 7	S W b W	
		4	2		52			
Aug.			W 1	Fair Sunſhine Day.	58	W b S 0		Fair and ſome Clouds.
			NW 1					
		5	1		51			
Sept.		15	SW 3	Rain. High Winds.	33	S b W 5	S S W	Storms with Showers.
					29	W b S 8		
		25	4		38			
Octob.		05		Much Rain.	13	WSW 6		Stormy Day.
					14	7		
		05	S W 3		14			
Nov.		85	W 1	Cloudy.	81	NW b W 1		Cloudy.
					84			
		85	W 1		82			
Decem.		05	S W 3	Rain. Warm.	21			
Jan.		05	E 1	Temperate and Miſty.	01	NNE 0		Cloudy dark Day.
					06			
Febr.		65	N 2	Clear. Cold with Snow.	62	NNE 3		Froſt and Snow w^th^ Fair.
					59	3		
					52			

A TABLE ſhewing the Coaſting and Strength of the Winds and the Weather every firſt Day of the Month in the Year 1715, and the Quantity of Rain in that Month, obſerved at *Harvard-College* in *Cambridge* in *New-England*, by Mr. *Tho. Robie*; and the Height of the *Mercury* in the Barometer, the Coaſting and Strength of the Winds and Clouds, the Weather and Rain at the ſame Time at *Upminſter*, by *W. Derham*, F. R. S.

	HARVARD-COLLEGE.			UPMINSTER.				
Month.	Winds.	Rain.	Weather.	Barom.	Winds.	Clouds.	Rain.	Weather.
		Lib. Cent.						
Jan.	W N W W b N S	5. 17		30. 11 10 14	N E 3 2		4. 31	Hard Froſt and Cloudy.
Febr.	S W 1 S W 3 W 0	12. 92	Hazy. Snow. Cloudy.	29. 75 30. 10	W S W 7 10		3. 7	Stormy.
March.	W 1 S W 1 S W b W 1	5. 14	Hazy. Cloudy.	29. 40 48 40	E N E 3 4		12. 53	Cloudy. Miſling. Rain.
April.	NW b W 5	12. 71	Snow.	65 60 46	S b W 1 E 3	S.	13. 19	Fair with Cloudy.
May.	Calm. E 3 E 4	13. 14	Froſt. Serene.	32 39 30	S b E 4 S W 2		4. 66	Rain. Fairer.
June.	S W 2 W N W 0 S W 1	13. 63		69 69 72	N N W 0 N W 2	S W	16. 34	Fair with Cloudy.
July.	NW b W 3	14. 42	Showery.	65 71 77	W 1 N W 1		20. 00	Cloudy. Thunder and Rain.
Auguſt.	N W 0	9. 64	Serene and Pleaſant.	30 28 28	N W 0	S W.	20. 49	Fog. Rain. Fairer.
Sept.	N E 0 E 1 0	*Sept.* *and* *Octob.*	Fair.	55	S S W 4		9. 17	Fair. Rain.
Octob.		30. 78		75 72 50	W S W 0 1		14. 08	Hoarfroſt Fair. Rain.
Nov.	W 0 N W 1 N 1	7. 24	Fair with Cloudy.	54 54 38	S W 0 W b N 1		8. 53	Rain. Cloudy.
Dec.	W 3 W N W 3 W 1	5. 83	Fair and Cold.				2. 55	

A

A TABLE of the like Obſervations in the Year 1716, as thoſe in the preceding Table, except the Rain in *New-England* which Mr. *Robie* omitted.

	HARVARD-COLLEGE.			UPMINSTER.				
Month.	Wind.		Weather.	Barom.	Winds.	Clouds.	Rain. Lib. Cent.	Weather.
Jan.	N W 2 N W 2		Cold and Clear.	29. 62 59 76	WbN 0 NbW 0		8. 61	Thaw wth Miſling & Cloudy.
Febr.	NWbW 1 N 0 E 0		Cold hard Froſt.	30. 15 18 21	NNE 2 1		1. 76	Black Clouds.
Mar.	E 0 N 0 N W 1		Rain. Fairer.	29. 42	WbN 0		1. 93	Fair.
April.	S E 1 N W 6		Cloudy. Fair.	85 85 80	E b S 1 E S E	S. S.	5. 04	Fair and Pleaſant.
May.	N 0 E 1 S 2		Fair.	30. 00 29. 97	N 2		9. 52	Fair warm Day.
June.			Rain.	94 98 30. 01	NNW 1 N bE 4	NNW	8. 24	Cloudy. Rain. Fairer.
July.	N W 1 0		Fair and Cool.	29. 91 92 90	N W 0 W 3	N b E	4. 47	Fair Pleaſant Day.
Aug.				88 88 92	W N W 1 N W 4	N W	2. 11	Cloudy. Fairer. Cloudy.
Sept.	S W 2 6 4		Fair and ſome Clouds.				9. 87	
Octob.	W 1 S W 2 S 1		Fair. Hoar-Froſt.	51 52 50	W b S 0 0		15. 75	Cloſe dark Day. Rain.
Nov.	W 1 W N W 1 1		Fair and Pleaſant.				4. 41	
Dec.	N 1 N E 2		Cold and Raw. Snow.	68 87	N bW 2		7. 16	Froſt and Fair.

REMARKS on the foregoing TABLES.

In that for the Year 1707.

I. I Obſerve there is a great Agreement between the *Barometers* at *Coventry* and *Upminſter*, in their *Riſing* and *Falling* near the ſame Time, at leaſt not many Hours before or after one another, and for the moſt Part in the ſame Proportion. Alſo when one is *Stationary*, the other is ſo too, eſpecially if of any Continuance: But at *Coventry* the *Mercury* is lower than at *Upminſter* about a tenth of an Inch, the Situation at *Coventry* being, I ſuppoſe, higher than that of *Upminſter* about 82 Feet, according to my Experiments in *Philoſ. Tranſ.* Numb. 236.

II. I obſerve alſo a greater Conformity between the Winds, than (conſidering the Cauſes of their perpetual Change) would be imagined. For although they may vary a Point or two, yet generally through all the eight Months, they tended nearly towards the ſame Point of the Compaſs, and changed in one Place as they did in the other; eſpecially when they blew ſtrongly, or were of ſome Continuance. I have obſerved, that a Storm in one Place is ſo in the other; of which the Diaries at large give many Examples; and in this Table of 1707, in the Months of *September* and *October*, where Mr. *Beighton* hath noted the Winds Strength to be three and four, it is about the ſame Strength with mine of five, ſix, ſeven and eight, I taking in more Degrees of the Strength of the Winds than he.

III. I obſerve alſo, that the Weather in each Place is for the moſt Part nearly the ſame.

IV. I have often obſerved, that the Falling of the Quickſilver in dark and cloudy Weather betokeneth Rain; but the Rain is always preceded with Fair Weather: And when the Fair comes, the Foul is not far off. And this chiefly happens, when the Wind is in any of the Eaſterly Points.

V. In *January* $170\frac{6}{7}$, many were troubled with cuticular Eruptions, which itched much. After this the Meaſles were epidemical 'till the latter End of *May*.

VI. The Beginning of this Year being very dry, and often the Weather cold (as appears by my Tables at large) Hay was ſcarce, and became very dear.

VII. *July* 8, commonly called the *Hot-Thurſday*, was the hotteſt Day that hath happened ſince I began my Meteorological Obſervations. A young Man (once my Servant) working in Harveſt harder than ordinary, was overcome with the Heat, and died: And diverſe Horſes on the Road that Day, dropped down, and died alſo.

VIII. In *November* and *December* the Air being moiſt, and frequently cold, Coughs were epidemical with us.

IX. I hope I ſhall be excuſed if I go out of the Bounds of this Table, and obſerve that the unſeaſonable Froſts in *April* 1708 (particularly *April* 25th and 26th) blaſted the tender young Leaves and *Catkins* of the Oak, Wallnut-Tree, *&c.* which I take to be the Reaſon that few Acorns and Wallnuts were that Year. From whence it is a juſt Concluſion, That the *Catkins* are of greateſt uſe to the Fertility of ſuch Trees that bear them; but whether as a Male-Sperm I ſhall not determine.

X. This

X. This Month of *April* alſo Horſes were every where ſeized with dangerous Coughs; of which many died in *London*, and other Places, eſpecially ſuch as laboured on the Roads. I have great Reaſon to think theſe Colds were catching, becauſe my Horſes that went well to *London*, returned with great and ſudden Colds.

XI. *June* 11 (although it was the Day of the Summer Solſtice) was enſued with a very cold Night, my Thermometer deſcending nearly to the Point of an Hoar-Froſt.

REMARKS on the TABLES of 1715 and 1716.

The late ingenious Mr. *Robie*, at my Requeſt, was pleaſed to make, in *New-England*, *Meteorological Obſervations*, Morning, Noon and Night, to correſpond with mine at the ſame Time at *Upminſter*.

Theſe Obſervations he made in 1715, *&c.* to the End of 1722, and ordered them to be ſent to our *Royal Society*; and accordingly I received them, not long ſince, from his ingenious Succeſſor at *Harvard-College*, Mr. *Iſ. Greenwood*, and now preſent them, with my own, to the *Society*.

But by reaſon they are too long to be read at the *Society*'s Meetings, or to be inſerted in the *Tranſactions*, I have therefore made the foregoing Extract from them, together with ſome Obſervations of my own, which tally with them.

But I am ſorry that Mr. *Robie*'s Obſervations want thoſe of the Barometer and Thermometer: Neither of which

which Inſtruments was to be gotten in *New-England*. Could we have had thoſe Obſervations, they would have been of great uſe in ſeveral Phænomena of thoſe diſtant Places, which now I can only gueſs at: And,

I. I gueſs, that notwithſtanding *Harvard-College* is ten Degrees more South than *Upminſter* (it being, as Mr. *Robie* ſays, *in Lat.* 42 *Deg.* 25′ *North*, and *Longitude from* London 4^h 44′ *as corrected by the beſt Obſervations*, that I ſay) they have as *cold*, if not colder Seaſons than we have here.

II. Although the ordinary Agreement or Diſagreement of the Winds, deſerves no Remark, yet it may deſerve Obſervation, That when the Winds have continued long in one Point, they have nearly agreed in both Places, and eſpecially when they have been high, and ſtrong for ſome time. In which Caſe I have obſerved, that there have been ſome Days Difference in the coming of thoſe Winds, as if they were ſo many Days in their Paſſage from Place to Place.

And this Agreement of the Winds, together with that of the Aſcent and Deſcent of the Quickſilver before-mentioned, diverſe curious Obſervers have taken Notice of, as well as my ſelf, between diſtant Places, though not ſo far as *New-England*; as *Zurich*, *Paris*, *Lancaſhire* and *Upminſter*; as may be ſeen in the *Philoſoph. Tranſ.* particularly Numb. 208, 286, 297, and 321.

III. I obſerve, that they have in *New-England* many more *Parelij*, *Halo's*, *Lunar Rainbows*, and ſuch like Appearances: Alſo more *Earthquakes*, *unuſual Meteors*, *Thunder and Lightening* than we have.

IV. The

IV. The *Rain* in 1715 (which was the only Year in which Mr. *Robie* obſerved it) in the different Months, amounted to different Quantities; but in the whole Year, it was nearly the ſame as at *Upminſter*; that at *Harward-College* being 130,64 ℔, that at *Upminſter* 128,92 ℔. But conſidering that Mr. *Robie*'s *Tunnel* that received his Rain, was but 11½ Inches in Diameter, and mine exactly 12, therefore the Proportion of the *New-England* Rain may be accounted ſomewhat the greater.

V. I obſerved at *Upminſter*, that in *January* the Contagion which was very fatal among the *Black Cattle* about *London* the latter End of the laſt Year, came amongſt us, and deſtroyed many.

In *March* many were afflicted with *Head-aches*; and the *Small-Pox* was epidemical: And the Earth being very dry, the Ponds empty, and the Springs low, in that and the next Month there fell good Store of ſeaſonable Rain, as the Table for that Year ſhews, but not ſufficient to fill the Ponds. But in *June*, *July* and *Auguſt*, more Rain fell than was welcome; which filled the Ponds, but hurt the Hay, and Corn, and made the Ways as dirty as in Winter.

In the Summer this Year I had many Confirmations of ſome former Obſervations in my *Phyſico-Theology*, *Lib.* I. *Ch.* 3. *viz. That a cold Summer is commonly a wet one.* Which this Summer was, the Spirits in the Thermometer being often low, particularly near the Point of *Hoar-Froſt* on *Auguſt* 12.

In *January*, the following Year 1716, the River of *Thames* was frozen for ſeveral Miles, and particularly ſo intenſely at *London*, that whole Streets of Booths were erected on the Ice, Oxen roaſted, Coaches

driven

driven, and many Diverſions exerciſed above Bridge. And ſo ſtrong was the Ice below Bridge, as to allow People to walk and skate at their Pleaſure thereon. But yet the Spirits in the Thermometer deſcended not all the while near ſo low, as on *December* 30, 1708.

In *Scotland* alſo (which in 1708 felt but little of that Year's ſevere Froſt) the Ice was ſtrong enough to bear the Horſe and Foot of the Armies.

And beyond Sea they ſuffered much; particularly in *Spain*, much Miſchief was done by the wild Beaſts, which were forced by the Froſt out of the Woods.

Among *Birds* I find the *Goldfinches* to have ſuffered much, having ſcarce ſeen one of them all the following Part of the Year; they being killed by the hard Weather, or driven to ſeek Food in other Parts.

On the —— Day of ——, the Wind was ſo violent, that the *Thames* was emptied from *London-Bridge* as far as ——, ſo that only a ſmall Rivulet of Water, no bigger than a Brook of 10 or 12 Foot over, remained; inſomuch, that People walked on the Bottom, and found Treaſure there.

In *November* and *December* Pleuriſies were frequent, and mortal in our Parts of *Eſſex*. The Weather was mild, open, dark, and damp for the moſt part, with now and then a cold Day or two.

Farther REMARKS from Mr. Robie's *Papers.*

On *February* 12, 171⅝, he notes an *Earthquake* to have been at *Salem Village*; and on *Octob.* 21

following the *Day was so dark, that People were forced to light Candles to eat their Dinners by.* Which could not be from an Eclipse, the Solar Eclipse being the 4th of that Month.

On *Feb.* 13, 171⅞, he observed an Immersion of the first Satellite of *Jupiter*, at $10^h\ 48'\ 17''$; and on *Feb.* 8 I observed an Emersion at $8^h\ 7'\ 30''$; according to which the Difference of *Longitude* between *Harvard-College* and *Upminster* is $4^h\ 45'$, and Mr. *Robie* says, that it is $4^h\ 44'$ from *London*, by the latest and best Observations.

Sept. 23, 1717, Mr. *Robie* observed the Solar Eclipse.

The Beginning at $12^h\ 23'$
The Middle at $1^h\ 47'$ or thereabout.
The End at $3^h\ 5'\ 10''$ *p. M.*
About 9 Digits were Eclipsed.

Octob. 5 following he observed the *Southing* of the Moon, at $9^h\ 32'$ *p. M.*

On *Feb.* 25, 171⅞, Mr. *Robie* saw the *Moon* cover *Aldebaran* at about $9^h\ 18'$ *p. M.* and the Star to emerge at $10^h\ 20'$ *p. M.* then by his Meridian Instrument (such as I have described in *Philos. Trans.* Numb. 291) being 2′ too slow; so that 2′ are to be added to the Time mentioned.

March 10, 171⅞, Mr. *Robie* observed an Emersion of the first Circumjovial at $10^h\ 45'\ 35''$.

Sept. 24, 1718, Mr. *Robie* observed the *Moon* to *South* at $9^h\ 38'$, or thereabout: On the 25th at $10^h\ 22'\ 32''$ *p. M.* On the 26th at $11^h\ 26'$ *p. M.*

Decemb. 5, a great *fiery Meteor* was seen in the Morning about Break of Day. And on the 9th, about half

half an Hour after Ten, in the S S W, he ſaw another, which made a Light like the Moon.

Dec. 19, the *Moon ſouthed* at 6^h 45′ 45″ *p. M.* On the 20th at 7^h 30′ 56″. On the 23d at 9^h 54′ 5″. On the 25th at 11^h 47′ 33″.

On *Jan.* 13, $171\frac{8}{9}$, the firſt *Circumjovial* immerged at 10^h 35′ *p. M.*

Jan. 17, The *Moon ſouthed* at 5^h 52′ 1″. On the 19th at 7^h 33′ 1″. On the 22d at 10^h 21′ 40″ *p. M.*

Feb. 16, *Moon ſouthed* at 6^h 15′ 15″: On the 19th at 8^h 59′ 40″: On the 21ſt at 10^h 54′ 30″ *p. M.*

On *Dec.* 11, 1719, a very unuſual *Meteor* was ſeen in the Evening.

On *Jan.* 8, $17\frac{19}{20}$, Mr. *Robie* ſays an *Earthquake* was.

On *Nov.* 24, 1720, Mr. *Robie* obſerved a *Streaming* from the Northern Horizon; as I did on *Nov.* 22 before.

On *Dec.* 10, 1720, about 8^h *p. M.* Mr. *Robie* firſt ſaw the *Light* that ſtrikes up toward the *Pleiades*; and on *Jan.* 6 following, he found it was increaſed, and almoſt reached to the *Pleiades.* And *Dec.* 7, 1721, he obſerved the ſame; and on the 25th he hath given this Figure of it: *h o* is the Part next the Horizon; V the Point toward the *Pleiades.*

This *Glade of Light* is the ſame that Dr. *Childrey* mentions in his *Britan. Bacon.* under the Name of *Semita luminoſa*; and which I ſaw, and gave a Figure of in *Philoſ. Tranſ.* Numb. 305.

Obſervations of the Eclipſe *of the* Moon *on* June 28, 1721.

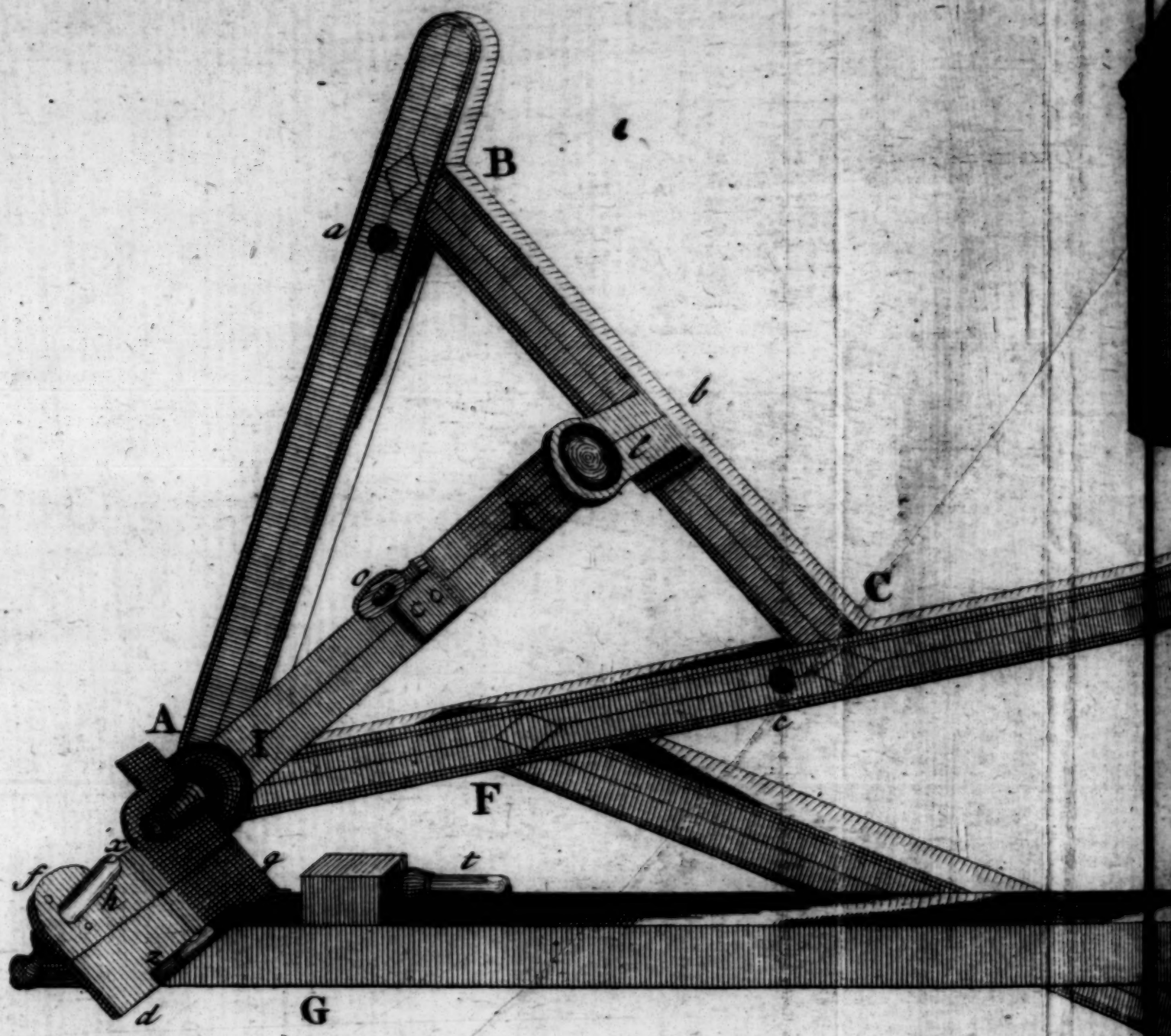
About Two in the Morning Mr. *Robie* viewed the *Moon* with his eight Foot Teleſcope, and ſhe was untouched.

Time Correct. H.	′	″	
2	10	00	A thin Penumbra.
2	12	00	Shadow is plainly entered.
2	18	10	*Palus Mæotis* covered.
2	31	40	*Mons Porphyrites* touched.
2	34	20	—— —— —— covered.
2	47	10	Moon eclipſed about ſix Digits.
2	49	05	*Besbicus* juſt touched.
2	50	30	—— —— covered wholly.
2	53	40	*Byzantium* touched.
2	54	10	—— —— covered.
3	05	40	*Palus Meotis* touched.
3	18	30	Moon wholly covered.

There remained a Light on the Weſtern Side of the Moon for ſome Time.

About 3 ^{h} 50′ in the Morning the Moon was wholly hid by the Haze, and coming on of Day-Light, that nothing could be ſeen of her; although from the Immerſion 'till now ſhe was viſible.

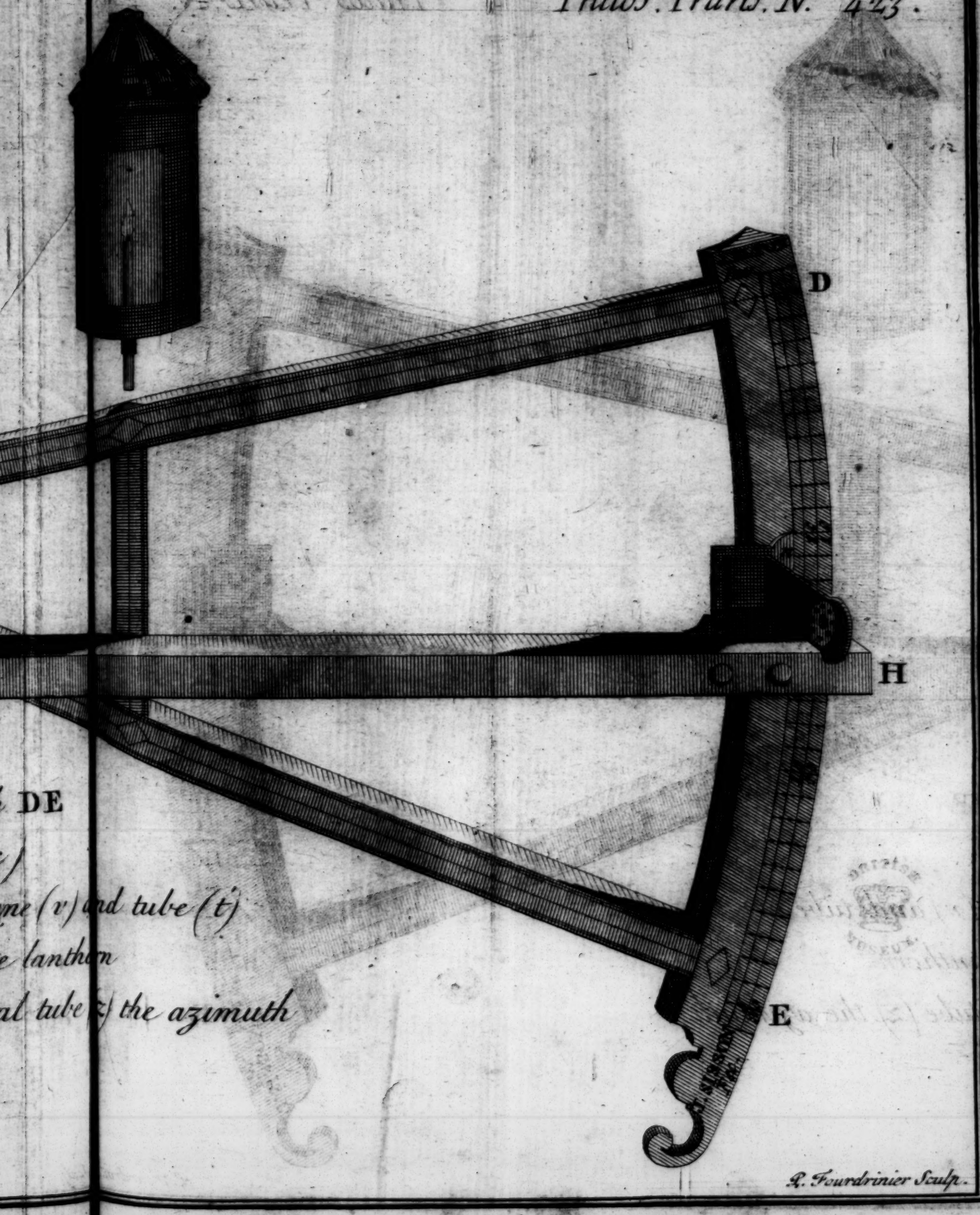
The



AB CDEF *the Frame with the graduated Arch* **DE** *chord* **BC** *& 3 holes or stops for the Label (a b c)* **GH** *the Index with a Nonius plate (n) eye vane (v) a* **IK** *the Label (l) the lens (o) the stool for the lanthe d f g. the shield or ray plate (h) the horizontal tube tube and (x) the axis.*

P. Walter delin.t

P273 V2



DE

)

ne (v) and tube (t)
e lanthorn
al tube (z) the azimuth

R. Fourdrinier Sculp.

The Obſervations Mr. Robie *made on the* Solar Eclipſe, Nov. 27, 1722, *were as follows:*

H. ′ ″

7 27 00 He ſaw the Sun riſe eclipſed about four Digits on his ſupreme Vertex; to the S W the greateſt Part of the Shade lay.

Then we could obſerve no more 'till

8 30 00 The Sun began to appear, and ſix Digits, or thereabouts, were eclipſed.

8 55 15 The Sun was eclipſed 4 ¾ neareſt; and then the Sun's Diameter was to the Moon's, as 1000 to 972.

9 00 15 Were hid 4½ nearly; and the Sun's Diameter was to the Moon's as 1000 to 975.

9 19 45 A little Spot on the Sun emerged.

9 25 45 I ſaw the Moon go off the Sun, and Mr. *Danforth* at the ſame Time: And Mr. *Appleton* at

9 25 20

II. *The Deſcription of a new* Quadrant *for taking* Altitudes *without an Horizon, either at Sea or Land. Invented by Mr.* John Elton.

THIS Inſtrument contains four principal Parts, *viz.* a Frame, an Index, a Label, and a Shield; and theſe conſiſt of ſeveral Parts. (*Vid. Tab.*)

The

The Frame has two Parts, one a graduated Arch of 30 Degrees, each Degree being ſubdivided into ſix equal Parts; the other a Chord of an Arch of 60°, divided into two equal Parts (at the Extremities and in the Middle of which are Holes or Stops for the Label) together making 90° or a Quadrant.

The Index turns upon the Center of the Frame the whole Compaſs of the Arch, and has three Parts; *viz.* a *Nonius* Plate, an Eye-Vane, and a Tube. The *Nonius* Plate moves with the Index, and ſubdivides each of the ſmall Diviſions of the Arch into ten equal Parts or Minutes. The Eye-Vane is to look through in forward Obſervations. The Tube is to ſhew, when the Index is horizontal.

The Label moves upon the Center of the Frame the whole Compaſs of the Chord of the Arch of 60°, having three fixed Stations thereon, at 30°, 60°, and 90°, and contains two principal Parts; *viz.* a Lens, and a Lanthorn. The Lens is to form the Sun's Image upon the Shield. The Lanthorn is neceſſary in Nocturnal Obſervations.

The Shield is fixed in the Center of the Frame, and has three Parts; *viz.* an Azimuth Tube, a Horizontal Tube, and an Axis, or in Backward Obſervations a Ray-Plate. The Hole in the Shield is to receive the Sun's Image. The Azimuth Tube is to direct the Plane of the Inſtrument perpendicular. The Horizontal Tube is to ſhew when the Label is level. The Axis is to cut the Object in forward Obſervations.

Rule

Rule for either backward or forward Obſervations.

If the Altitude does not exceed 30°, the Label muſt be placed at the Station on the Radius or longeſt Limb of the Quadrant; if the Altitude is between 30° and 60°, at the middle Station; and if the Altitude exceed 60° at the uppermoſt Station.

To take the Sun's Altitude by a backward Obſervation.

This is done without uſing the Sight-Vane or Horizontal Tube on the Shield. Hold the Quadrant with both Hands in ſuch a manner as is apteſt for keeping it ſteady, the Back of the Arch being turned toward the Sun. When the Bubble of the Azimuth Tube is brought under the Hole in the Shield, cauſe the Sun's Image to fall on the Hole in the Shield, ſo that it may reſt in the Center of the Sun's Image; the Inſtant the Azimuth Tube and Sun's Image are thus regulated, ſee if the Bubble in the Horizontal Tube on the Index (which 'till then is diſregarded) leaves the open End of the Tube, or ſtops any where clear of the Ends of the Tube: If theſe happen at the ſame Juncture, the Altitude is then truly taken; but if the Bubble had remained in the encloſed End of the Tube, when the Azimuth Bubble and Sun's Image were regulated, the Index muſt have been ſlid up; and if tarried in the open End, moved down, until the Horizontal Bubble on the Index quit the open End of the Tube, or ſtop between the Ends, as was before obſerved; and then is the Quadrant ſet. In continuing the Obſervation for a Meridian Altitude, the Quadrant being

being ſet, as the Sun riſes, the Horizontal Bubble on the Index will not quit the open End of the Tube, or ſtop between the Ends, but hang there, or leave it after the Azimuth Bubble and Sun's Image have been regulated, which will require the Index to be continually moved down in order to keep the Quadrant ſet. When the Sun is up, or on the Meridian, the Quadrant will remain ſet for ſome time; and on the Sun's falling, the Horizontal Bubbie will have a reverſe Tendency inclining or running wholly to the encloſed End of the Tube.

To take the Altitude of the Sun or Stars by a forward Obſervation.

In this Method, the Lens and Tube on the Index are diſregarded. Hold the Quadrant vertical, and looking through the Eye-Vane, direct the Axis or upper Edge of the Shield to the Sun or Star; if the Axis cut the Sun or Star at the ſame Inſtant that the Bubble in the Horizontal Tube on the Shield quit the open End, the Altitude is then truly taken, and the Quadrant ſet. But if it ſhould leave the open End of the Tube before the Axis or upper Edge of the Shield cut the Sun or Star, then the Eye-Vane (or which is the ſame, the Index) muſt be ſlid down; and if it remain at the open End, or quit it when the Axis is above the Sun or Star, moved up until the Quadrant is ſet. In continuing the Obſervation for a Meridian Altitude, as the Sun or Star riſes, the Bubble in the Horizontal Tube will always quit the open End of the Tube before the Axis cut the Object; ſo that to keep the Quadrant ſet, the Eye-Vane muſt on every ſuch Alteration be conſtantly moved down; while the Sun

Sun or Star is on the Meridian, the Quadrant will remain ſet; and when the Sun or Star falls, the Bubble will act contrary to what it did in the riſing, reſting wholly in the open End of the Tube.

To take the Sun's Altitude with the Horizon.

Turn the Back of the Arch towards the Sun, and cauſe the Sun's Image to fall on the Hole in the Shield, at the ſame time looking through the Eye-Vane, cut the Horizon with the Axis.

N.B. In taking the Altitude of the Stars, a ſmall Light muſt be fixed in the Lanthorn; the leſs the better. It will be beſt in forward Obſervations of the Sun, to take the Altitude of the upper Limb, allowing for the Semidiameter; and when the Sun is very clear, take his Altitude by a backward Obſervation, the forward Method being chiefly intended for Nocturnal Obſervations, and when the Sun is too much obſcured to give any Shade or Image.

There was at the ſame time laid before the *Society*, " An Extract made by Mr. *Elton* of Obſervations of " the Latitude from the Journal of Capt. *Walter* " *Hoxton*, Commander of the Ship *Baltimore* from " the River of *Thames* to *Maryland* on the Conti- " nent of *America*, by *Davis*'s (or the common) " Quadrant with the Horizon, and by Mr. *Elton*'s " (a new invented Quadrant) without the Horizon, " *Anno Dom.* 1730."

From this Extract it is obſervable, that in moderate Weather the Difference of the Obſervations, made

by the two Sorts of Quadrants, was commonly no more than 1′; with ſtrong Gales and a large Sea 5′; in fair Weather; in hard Squalls; the Sea running high, 6′; in eaſy Gales 9′; in fair Weather and a large Swell 16′; once in ſmooth Water 16′; and the greateſt Difference of all was, with freſh Gales, 21′: And this Difference was conſtantly found to give the Latitude more Northerly by Mr. *Elton*'s Quadrant than by *Davis*'s; as in this laſt mentioned Inſtance the Latitude appears to be 35° 39′ N. by *Davis*'s, when Mr. *Elton*'s makes it 36° N. There is a Note added by Capt. *Hoxton* at the End of this Journal; *viz. That the Difference at different Times between* Davis's *and* Elton's *Quadrants is occaſioned by ſhifting the Shade-Vane of* Davis's.

To this Journal were annexed ſome "Obſervations "of the Latitude by the fixed Stars in the foreſaid "Voyage by Mr. *Elton*'s Quadrant, without uſing "the Horizon."

Theſe Obſervations are generally taken from two Stars, and the Latitude calculated from each Obſervation; and ſo they are found to agree commonly within 4′ or 5′. The greateſt Difference aroſe once to 13′. When by an Obſervation taken by * *Syrius*, the Latitude was found to be

	42° 46′ N.	by * *Procyon*	42° 56′ N.
Courſe inter Obſ. SSW.		Where the Difference is	13′ N.
S 3′ ½	0° 3′		
	42° 43′		

Capt.

Capt. *Hoxton*, when at Anchor in *Cheſea-Peak* Bay, found the Latitude 37° 29' N. Off *Cedar Point* in *Potuxon* River 38° 7' N. Off Cape *Henry* 37° 6' N. And in a Letter to Mr. *Elton* he declares, " That he obſerved with his Quadrant both " by the Sun and Stars, in all the various Sorts of " Weather he met with in his late Voyage to and " from *Maryland*, without regarding the Horizon, " with as great Exactneſs, as with *Davis*'s Quadrant " when the Sun and Horizon were clear."

There was likewiſe put into the Hands of the Publiſher, another Letter from one Mr. *John Walton* to Mr. *Elton*, containing ſome Obſervations of the Latitude in *Leghorn* Road, and ſeveral of the Ports of *Spain*, which were found, after repeated Experiments, exactly to agree with the known Latitudes of thoſe Places: Mr. *Walton* adds, That he made ſeveral Obſervations in his Paſſage Home, in hard Gales, and a great Sea, and when it was ſo hazy, that the common Quadrant was of no uſe, for want of an Horizon.

III. *A remarkable Caſe of a Gentlewoman who died of a* Hydrops Ovarii, *in the Thirty-third Year of her Age, after having been tapped Fifty-ſeven times. By Mr.* John Belchier, *Surgeon.*

IN the Year 1725, the Wife of Mr. *Newberry*, a Merchant in this City, complained of a Pain in her Left-Side, near her Groin, internally, which ſen-

ſibly increaſed ; and perceiving a Swelling in that Part, ſhe at firſt thought herſelf with Child ; but having other Symptoms not very common with gravid Women, ſhe ſent for a Phyſician, who immediately diſcovered it to be Hydropical, and after following his Preſcriptions for ſome time, and finding little or no Benefit thereby, ſhe ſent for another, and ſo for a third and fourth ; and after between two and three Years fruitleſs Trial of proper Medicines preſcribed by the Phyſicians, ſhe growing very big and uneaſy with her Burden, was adviſed to be tapped, to which ſhe accordingly ſubmitted : And on *May* the 6th, 1728, ſent for Mr. *Cheſelden*, who took from her between four and five Gallons of Water; but in a Week or ten Days after the Operation ſhe perceived her ſelf to fill again, in which State ſhe continued to the firſt Day of *July* following, when Mr. *Cheſelden* tapped her again, and took from her about the ſame Quantity of Water as before ; and in this Manner ſhe continued to fill and be tapped every third or fourth Week, from the 6th Day of *May*, 1728, to the 3d of this Inſtant *March*, $173\frac{1}{2}$, when ſhe died, in the Thirty-third Year of her Age.

During the laſt Thirty-ſeven times of her Tapping, I conſtantly attended her with Mr. *Cheſelden*, when ſhe always ('till the two laſt times) appeared very briſk and lively the whole time of the Water's running from her, and was not in the leaſt ſick or faint after the Diſcharge of the Water, as is uſual ; and though ſhe was a very thin emaciated Woman, ſhe would frequently walk three or four Miles the Day before the Operation, and moſt commonly went abroad the third Day after it.

The Quantity of Water taken from her each time of Tapping was between four and five Gallons; and during the whole Fifty-ſeven times Tapping, there never was above a Quart, or two Quarts at moſt, different in the Quantity, 'till the two laſt times, at each of which the Quantity did not exceed two Gallons: But in the Intervals of theſe two laſt Operations, ſhe was frequently troubled with Reachings to Vomit, which burſt open the Orifice twice where ſhe was tapped, and at each time diſcharged about ſix Quarts.

The Quantity of Water which was taken from her each time was always meaſured, and upon Computation the whole amounts to near Two hundred and fifty Gallons. The Water that was taken from her the two laſt times of Tapping was much more viſcid than the former.

At times ſhe frequently complained of a violent Pain on her Right Side, and a heavy aching Pain in the *Pelvis*. She had likewiſe a *Prolapſus Uteri*; and ſome time before her Death ſhe could not expel her *Fæces* but with great Difficulty and Pain, and at the ſame time laboured under an Incontinency of *Urine*.

On *Monday* the 6th of this Inſtant I opened her in the Preſence of her Phyſician, when I found the whole *Viſcera*, from the *Diaphragm* to the *Oſſa Pubis*, covered with a thick gelatinous Subſtance, which ſeemed to be membranous, which at its firſt Appearance I took for the *Omentum* in a putrified State; but after a farther Examination, I found it to be only the more viſcid Parts of the extravaſated Fluid, which could not be diſcharged by the Operation: After removing this, I found ſeveral Portions of a hard

ſchirrous

ſchirrous Subſtance ariſing from the *Fundus* of the Stomach, one large Portion of which was inſerted into that Part of the *Colon* near the Right *Kidney*, and in Appearance reſembled the *Pancreatic Gland*. Another Portion, which was Cylindrical, and about two Thirds of an Inch in Diameter, paſſed ſtreight over the Inteſtines, adhering ſtrongly to that Part of the *Colon* which lies under the *Stomach*, and was inſerted into the *Rectum*, in the *Pelvis*. Another Portion of this Subſtance paſſed directly over the *Inteſtines* to the *Pelvis*, but about the Middle of the *Abdomen* it ſent out two ſmaller Portions, the one was inſerted into the *Meſentery*, the other reflecting back, was inſerted into the *Colon* on the left Side near the *Stomach*. As ſoon as I cut into one of theſe Portions, I diſcovered it to be a Part of the *Omentum* twiſted up, and contained in a very thick capſular Membrane.

The *Diaphragm* was forced up ſo far by the Contents of the *Abdomen*, that the Cavity of the *Thorax* was decreaſed to near one Third.

The *Liver* was much larger than in a natural State, and of one intire Subſtance, and not divided into *Lobes*, the whole Convex Surface adhering firmly to the *Diaphragm*.

The *Stomach* was very ſmall, as to its Cavity, but the *Coats* of it were increaſed to ſix times their natural Thickneſs (as were likewiſe all the *Coats* of the *Inteſtines* and *Meſentery*) and very much inflamed.

Two Thirds of the *Stomach* adhered to that Part of the *Diaphragm* which did not cover the *Liver*, and the other Part adhered to the concave Surface of the *Liver*; as did likewiſe the *Duodenum*, whoſe Cavity

was

was very large. Below the *Duodenum*, the *Colon* adhered to the lower Part of the Concave Surface of the *Liver*, ſo that the whole *Liver* was contained in a kind of *Burſa* compoſed of the *Diaphragm*, *Stomach*, *Duodenum* and *Colon*.

The *Cæcum*, *Colon* and *Rectum* were much larger than in a natural State, and adhered ſo very ſtrongly to the Parts over which they paſſed, that it was with much difficulty I could ſeparate them.

The *Spleen* was not one Fourth of its natural Size, and one Half of its external Surface was entirely Cartalaginous.

The *Pancreas* was ſmaller than uſual, as were likewiſe the *Kidneys*, *Ureters* and *Bladder*; and in the *Pelvis* of each *Kidney* there were ſmall ſabulous Concretions.

The left *Ovarium* was diſtended to ſo large a Size, as to fill the whole Cavity of the *Pelvis* up to the *Os Pubis*; its Surface was Cartalaginous, like that of the *Spleen*, and in it were contained a great Number of *Hydatides* of different Sizes, whereas the right *Ovary* was no ways diſeaſed in the leaſt.

The Difficulty and Pain complained of in the Expulſion of the *Fæces*, naturally ariſe from the Preſſures on the diſeaſed *Ovarium*, at the ſame time that its increaſed Bulk, by compreſſing the *Inteſtinum Rectum* impeded the Egreſs of the *Fæces*, and brought on the Inflammation of the *Inteſtines*, which we obſerved.

The *Prolapſus Uteri*, and the Incapacity of the *Bladder*'s retaining a proper Quantity of *Urine*, were likewiſe occaſioned by the Preſſures of this diſeaſed *Ovarium* upon thoſe Parts.

But

But what ſeems moſt material in this Caſe, is the viſcid Matter found in the Cavity of the *Abdomen*; which as the Waters were originally incyſted in the *Ovary*, was properly extravaſated from the *Cyſtus* into the *Abdomen* in the two laſt Operations; by which, as well the Quantity drawn off as the cuſtomary Relief, were very much diminiſhed; in lieu of which the *Stimulus*, from ſuch a Fluid, might reaſonably bring on the Vomiting obſerved from that time.

Quer. Therefore, if ſuch a Vomiting enſuing the Operation is not a fatal Symptom?

Quer. If any Method can be found to prevent ſuch Extravaſations?

The Relations of this Gentlewoman are of Opinion, that her Diſeaſe was occaſioned by pulling off her Cloaths, when ſhe was very hot, to go into a Bathing-Tub of Water to cool her, when finding the Water exceſſive cold, ſhe put only her Legs in, the other Part of her Body being out of the Water, and naked at the ſame time; which happened a few Weeks before ſhe perceived the Swelling and Pain in her *Pelvis*; and probably this might be the Cauſe. As the Conſtriction of the lower Parts by the cold Water might, in a great meaſure, impede the *Fluids* circulating through the lower Parts, and the Blood being at the ſame time rarified and expanded by the Heat, might therefore burſt through the more tender *Lymphaticks*, and produce the Extravaſation.

IV. *A Letter from Mr.* Stephen Gray *to Dr.* Mortimer, *Secr. R. S. containing a farther Account of his* Experiments *concerning* Electricity.

Charter-House, June *7th*, 1732.

SIR,

SINCE my laſt (N° 422) wherein I gave an Account of my Experiments, ſhewing Water will be attracted by Electrick Bodies, and that it may have an Electrick Vertue communicated to it, ſo as to attract ſolid ones, I have been upon another Enquiry; Whether there might not be a Way found to make this Property of Electrical Attraction more permanent in Bodies? How far I have ſucceeded in this Attempt, will appear by the Experiments I have made on the ſeveral Bodies mentioned in the following Catalogue; and as they were all of them prepared after the ſame manner, excepting Numb. 18 and 19, which ſhall be deſcribed afterwards, a general Deſcription of the Method of preparing and preſerving them in a State of Attraction, may ſuffice.

The Bodies on which the Experiments were made, were Roſin both black and white, Stone-Pitch, Shell or Gum-Lac, Bees-Wax, and Sulphur. I procured three Iron Ladles of ſeveral Sizes, in which I melted theſe Subſtances, making uſe of that which I thought moſt convenient for the Quantity I deſigned to melt. When any of theſe Bodies were melted, they were

taken off the Fire, and ſet by in the Ladle to cool and harden; then it was returned to the Fire, where it remained 'till it was melted about the Bottom and Sides of the Ladle, ſo as to be moveable; ſo that by inverting the Ladle, it might be taken out; having the Form of nearly the Section of a Sphere, the Convex Surface, as alſo the Plain one, being naturally (if I may ſo ſay) poliſhed, excepting the Sulphur, which cools without retaining its Poliſh, except when caſt in Glaſs Veſſels, as ſhall be ſhewed hereafter. I ſhall now proceed to the Experiments and Obſervations made on theſe Electrick Bodies.

When any of them were taken out of the Ladle, and their Convex Surface hardened, they would not at firſt attract, 'till the Heat was abated, or 'till they came to a certain Degree of Warmth, and then there was a ſmall Attraction; which Warmth I eſtimated to be nearly that of a Hen's Egg when juſt laid: The Attraction encreaſing ſo, as when cold, to attract at leaſt ten times farther than at firſt.

The manner of preſerving them in a State of Attraction, was by wrapping them up in any thing that would keep them from the external Air; as at firſt for the ſmaller Bodies I uſed white Paper, but for the larger ones white Flannel; but afterwards found that black Worſted Stockings would do as well. Being thus clothed, they were put into a large Fir Box, there to remain 'till I had Occaſion to make uſe of them.

The Cylinder of Sulphur, Numb. 18, was made by melting the Sulphur, and pouring it into a Cylindrick Glaſs Veſſel, which had firſt been heated, to prevent its cracking. When the Sulphur was hardened, it

was

was ſomewhat leſs than the Glaſs; ſo that by inverting the Glaſs, it came out eaſily, and had a poliſhed Surface almoſt as ſmooth as the Glaſs in which it was caſt. The large Cone of Sulphur, Numb. 19, was made after the ſame manner; *viz.* by being caſt in a large Drinking-Glaſs.

I am now to give an Account of the Obſervations made on the ſeveral Bodies mentioned in the Catalogue, but muſt firſt give a Deſcription of the Catalogue. The firſt Column contains the Number, which in a ſmall Piece of Paper is fixed on each of the ſeveral Bodies; the Name of which is given in the ſecond Column, whether they are ſingle or compound Subſtances. The third Column ſhews of what Weight they were of when melted, in Ounces and Drachms of *Averdupois* Weight. In the fourth Column you have the Days of the Month when the Body was melted and received its Form, and conſequently when it firſt began to attract.

I did for thirty Days continue to obſerve every one of theſe Bodies, and found that at the End of the ſaid Time they attracted as vigorouſly as at the firſt or ſecond Day, as they do now at the writing hereof. By the Times mentioned in the Catalogue, being ſubſtracted from any Time after, will be ſhewn how long any of the Bodies have continued their Attractive Vertue; by which it will appear, that ſome of them have not loſt their Attraction for more than four Months: So that we have ſome Reaſon to believe, that we have now diſcovered that there is *a perpetual attractive Power* in all Electrick Bodies, without exciting by either rubbing, beating, &c. or any other Attrition. But this will further appear by the Account I am now to give of the two

laſt Bodies mentioned in the Catalogue. The Cone of Sulphur, Numb. 19, that was caſt in a large Drinking-Glaſs, in about two Hours after it was taken out of the Glaſs, attracted, and the Glaſs attracted too, but at a ſmall Diſtance. Next Day the Sulphur was taken out of the Glaſs, and then it attracted ſtrongly, but there was now no perceivable Attraction of the Glaſs. Then the Cone of Sulphur was ſet with its Baſe upon the Lid of the Fir Box, wherein the other Electrick Bodies lay, and the Glaſs whelmed over it. I examined it every Day after, and ſtill found it to attract; but finding the Place not ſo convenient, having Occaſion to look into the Box often, I removed it to the Table that ſtands between the two Windows of my Chamber, where it has continued to this Time, and whenever the Glaſs is taken off, attracts at near as great a Diſtance as the Sulphur that is clothed and ſhut up in the Box abovementioned. And though at firſt there was no Attraction, when the Glaſs was taken off, yet I now find, that in fair Weather the Glaſs alſo attracts, but not at ſo great a Diſtance as the Sulphur, which never fails to attract, let the Wind or Weather be never ſo variable, as do all the other Bodies mentioned in the Catalogue; only in wet Weather the Attractions are not made at ſo great a Diſtance as in fair Weather.

Number 20 is a Cake of Sulphur that was melted; and as the other Bodies have taken the Form of a Convex Section of a Sphere, this, when cold, was laid with its flat Side downwards, on the ſame Table with the Cone of Sulphur: They were both placed ſo near the Wall, as to prevent the Sun ſhining on them. This was, as the Catalogue ſhews, on the 18th

of *April*; and though it had no manner of Clothing or Covering, has attracted ever ſince. And in this, as in the other Bodies, the Attraction will be according to the Weather; but when it attracts the ſtrongeſt, it is not more than the tenth Part of what the Cone of Sulphur, that is covered, attracts.

The manner of obſerving theſe Attractions is beſt performed by holding the Attracting Body in one Hand, and a fine white Thread tied to the End of a Stick, in the other; by this means far leſs Degrees of Attraction will be perceived, than by making uſe of Leaf-Braſs. When the Thread is held at the utmoſt Diſtance, it may be attracted; the Motion of it is at firſt very ſlow, but ſtill accelerating as it approaches nearer to the attracting Body.

I am now on the Subject of permanent Attraction in Glaſs, then in the other Bodies, but have not yet compleated thoſe Experiments, meeting with more Interruption by the Weather.

With a ſmall Hand Air-Pump that was lent me by a Friend, I have made Experiments on ſeveral Bodies, and find that they will attract *in vacuo*, and that at very nearly the ſame Diſtance as *in pleno*, provided that the Experiment be made in the ſame Receiver filled with Air; as will appear by the following Experiments.

There was taken a hollow Glaſs Sphere, of ſomewhat more than 2 ½ Inches Diameter, being firſt excited. It was ſuſpended by a Loop of Silk that went through a ſmall Cork, with which the Hole in the Glaſs Ball, by which it was blown, was ſtopped, and by the Loop ſuſpended on a ſmall Hook that was skrewed on to the Braſs Wire that came through the

the Collar of Leather in the Braſs-Plate that covered the Top of the open Receiver; as in the Experiment of letting fall the Guinea and Feather *in vacuo*. Then the Ball was drawn up to the Top of the Receiver, and the Top of the ſmall Stand, covered with Paper, was laid on the wet Leather on the Plate of the Pump, and Leaf-Braſs laid on the ſame. Then the Air was exhauſted, when the Glaſs Ball was let down to about an Inch, or ſomewhat more, towards the Pieces of Leaf-Braſs: Many of them were attracted by it. Then the Air was let into the Receiver, and the Leaf-Braſs laid on the Stand, the Ball being, as before, ſuſpended, was let down to about the ſame Diſtance from the Leaf-Braſs as before, and there ſeemed to be very little Difference in the Attraction.

I have made the ſame Experiments with Sulphur, Shell-Lac, Roſin, and white Bees-Wax. Theſe would be attracted to the Height of an Inch and a half by Eſtimation; and when the Experiment was made with the Receiver full of Air, there was very little, if any Difference in the Height of the Attraction, when there was the ſame Time ſpent before the Attraction was begun *in pleno*, as there was required to exhauſt the Receiver.

A CA-

A CATALOGUE of the ſeveral Electrick Bodies *mentioned in the foregoing Diſcourſe.*

N°	Names of the ſeveral Bodies.	Weight.	Month.	Days.
		℥	3	
1	Fine black Roſin — —	2	0 *January*	31
2	Stone Pitch and black Roſin	2	2 *January*	31
3	Fine Roſin and Bees-Wax	2	1 *February*	1
4	Stone Pitch — —	1	7 *February*	1
5	Stone Sulphur — —	3	6 *February*	4
6	Shell-lac — —	10	0 *February*	10
7	Fine black Roſin — —	10	4 *February*	11
8	Bees-Wax and Roſin —	9	0 *February*	12
9	Roſin 4, and Gum-lac	1 *part* 10	0 *February*	12
10	Sulphur — —	18	0 *February*	15
11	Stone Pitch — —	10	12 *February*	16
12	Black Roſin — —	23	0 *February*	23
13	White Roſin — —	7	12 *February*	25
14	Gum-lac — —	11	14 *February*	26
15	Gum-lac and black Roſin	*ana* 9	12 *February*	26
16	Gum-lac 4 *parts*, Roſin	1 *pt.* 17	8 *February*	28
17	Shell-lac, fine black Roſin	*ana* 28	4 *March*	2
18	A Cylinder of Stone Sulphur	19	4 *March*	20
19	A large Cone of Stone Sulphur	30	0 *March*	29
20	A Cake of Sulphur — —	11	4 *April*	29

S I R,

Be pleaſed to communicate theſe to the *Royal Society*, to whom I hope they will be no leſs acceptable than ſome of my former Diſcoveries from me, who am,

S I R,

Theirs, and your moſt Obedient Servant,

Stephen Gray.

V. *An Experiment to ſhew that the* Friction *of the ſeveral Parts in a* Compound Engine, *may be reduced to Calculation; by drawing Conſequences from ſome of the Experiments ſhewn before the* Royal Society *laſt Year, upon ſimple Machines, in various Circumſtances, by me. Now exemplified by the* Friction *in a Combination of* Pullies. *By* J. T. Deſaguliers. Jan. 14, 173$\frac{2}{1}$.

THE Machine conſiſts of three Pullies (two upper and one lower, or a Tackle of Three) whoſe Diameters are exactly as follows, 2 Inches, 1 $\frac{1}{2}$ Inch, 1 $\frac{1}{4}$ Inch; and all the Center Pins of $\frac{1}{4}$ Inch Diameter: The Rope being of $\frac{1}{10}$ Inch in Diameter.

The Weight is 18 Pounds *Averdupois*, and conſequently the Power to keep it in *Æquilibrio* muſt be = 6 ℔, and a very little more muſt make the Power raiſe the Weight, if there was no Friction; but here no leſs than 20 Ounces are required, though the Machine is as nicely made as it can poſſibly be.

I have ſhewn by Experiment, that when the Weight is unkown, $\frac{2}{3}$ of the Power is the Friction of a Cylinder whoſe Surface moves as faſt as the Power, and whoſe Gudgeons are equal in Diameter to the Cylinder. Now as the Diameter of the firſt Pulley is eight times bigger than its Pin, its Friction muſt be $\frac{4\ ℔}{8}$ or 8 Ounces.

The ſecond Pulley, whoſe Surface moves as ſlow again as the Power, and whoſe Pin is ſix times leſs

in

Diameter muſt of Conſequence have its Friction of only $5\frac{1}{2}$ Ounces; becauſe $\frac{64\ ʒ}{2} \over 6 = 5\frac{1}{3}\ ʒ$

The third Pulley moving with $\frac{1}{3}$ of the Velocity of the Power, on a Pin of $\frac{1}{4}$ of its Diameter, has for its Friction $4\frac{1}{3} - ʒ$; becauſe $\frac{64\ ʒ}{3} \over 5 = 4\frac{1}{3} - ʒ$

Now the Sum of all theſe Frictions being 17,6 ʒ which is the 5,4 Part of the Power 6 ℔, this Addition does ſo encreaſe the Friction as to require a Super-addition of the 5,4 Part of that firſt Addition, and ſo on, in this Series, ʒ 17,62 + 3,2 + 0,59, &c. = 21,41 ʒ.

Then the Sum of the Frictions upon account of bending the Ropes (too tedious to explain now, before I give a full Account in my intended Theory of Friction) deduced from the Experiment that a Rope of $\frac{1}{10}$ Inch in Diameter ſtretched by 6 ℔ requires 4,5 ʒ to bend it round a Cylinder of 1 Inch ———, amounts to 1,8 + 1,15 + 1,124 = 4,424 ʒ, which, with the other Friction, amounts to 25,834 ʒ. But as I have formerly ſhewn in theſe *Tranſactions*, that when a Rope drawn by unequal Weight runs over a Pulley, the Preſſure on the Pin is diminiſhed; that diminiſhed Preſſure (found by Calculation to be near 6 ʒ) being taken from the above Sum, the Friction remaining will be 19,834 ʒ; and the Experiment is juſt 20 ʒ.

N. B. Nothing was here allowed for the Weight added to bend the Ropes, which would ſtill bring the Experiment nearer the Theory.

Belgie
i Hilzeroth
Verhandel
2. Deel p.
464.

VI. *An Abſtract of a Letter, written in* Dutch, *to the illuſtrious* Royal Society *of* London, *by* Arnold Marcel (*Nephew to the late Mr.* Anthony van Leeuvenhoek, *F. R. S.*) *Communicated by the Rev^d. Dr.* J. T. Deſaguliers, *F. R. S.*

GENTLEMEN,

IN the Year 1726 I had the good Fortune to find out a Way to communicate the magnetical Vertue to Iron and Steel, without the Help of any Loadſtone whatſoever, and to make that magnetical Vertue as ſtrong as if it had been done with a very ſtrong Loadſtone. I have kept it ſecret ever ſince, longing for an Opportunity to communicate my ſaid Diſcovery (beſides ſome further Obſervations which I made about the Loadſtone) to your Honourable Society; being well aſſured that that illuſtrious Society is always uſed to give the due Honour to the Inventors. I now lately happily came to be acquainted with that worthy Member of your honourable Society, Dr. *John-Theoph. Deſaguliers*, who has promiſed me to be ſo good as to deliver this to your Hands.

In the Year 1722, I obſerved that a long heavy Bar of Iron being ſet upright, and ſome Filings of Iron, or a Bit of Iron Wire, laid upon its upper End, thoſe Filings or Wire would ſtick to another Piece of bright pointed Iron, and ſuffer itſelf to be lifted up from the ſtanding Bar even to the Height of five Inches.

In the Year 1726, making ſeveral further Obſervations about the magnetical Force, which I found in great

Pieces

Pieces of Iron, for want of larger I made uſe of what Tools I had, namely, a large Iron Vice, about 90 ℔ Weight, in which I fixed a ſmall Anvil of about 12 ℔. Upon the bright Surface of this Anvil I laid the Steel, to which I would give the Vertue, in a Poſition of North and South, which happened to be in a Diagonal of the ſquare Surface of the Anvil; then I took a Piece of Iron, 1 Inch Square, and 33 Inches long, of about 8 ℔ Weight, having at one End the Figure here repreſented (in *p.* 298.) brightly poliſhed at *a*, and taper at the other End: Then I held faſt down the Piece of Steel upon the Anvil with one Hand, and with the other I held the Iron Bar aforeſaid perpendicular with its Point *a* upon the Steel, and preſſing hard, I rubbed the Steel with the Iron Bar towards me, from North to South, ſeveral Strokes, always carrying the Bar far enough round about, to begin again at the North, to prevent the drawing back of the magnetical Force: Having thus given 10 or 12 Strokes, I turned the Steel upſide down, leaving it in the ſame Poſition as to North and South, and after rubbing it and turning it, 'till I rubbed it about 400 times, it received by degrees more and more Strength, and at laſt had as much as if it had been touched by a ſtrong Loadſtone. The Place where I began to rub was always that which pointed to the North, when the Needle was hung, the End where I had ended the Stroke turning to the South. Sometimes it has happened, that in a few Strokes I gave the Steel its Vertue; nay even in the very firſt Stroke one may give a great deal to a ſmall Needle. This Way I have given the magnetical Vertue to Needles of Sea-Compaſſes made of one Piece of Steel, as the Figure annexed B, ſo ſtrongly, that one of the Poles would take up $\frac{1}{4}$, and the other a whole

B

Ounce of Iron, although theſe Needles were anointed with Linſeed Oil, which made a hard Coat, to keep them from ruſting, yet they kept the Vertue; but in Strengthning theſe Sort of Needles, I rubbed by turns firſt to the right and then to the left Side.

The ſame Way I brought the Vertue into the Point of a Knife, ſo that it would ſuſtain 1 $\frac{1}{4}$ Ounce.

I brought the ſaid Vertue into four ſmall Pieces of Steel, each 1 Inch long and $\frac{1}{12}$ Inch broad, as thin as the Spring of a Watch. Theſe four Pieces I joined together, as into an artificial Loadſtone, weighing them 18 Grains *Troy*, and then it did draw up and ſuſtain an Iron Nail, which weighed 144 Grains *Troy*: This artificial Loadſtone has now theſe ſix Years been tumbled about, and been lying among Iron and Steel, and in any Poſition, and yet it has rather got more than loſt any of its Vertue.

The magnetical Vertue being thus brought into Iron or Steel, I have farther obſerved, that that End where the Stroke was begun, would draw to the North, and where the Stroke ended to the South, in whatever Situation the Steel had been laid upon the Anvil to give it the Vertue. I took a Piece of Steel and rubbed it from one End to the Middle, and then from the other End to the Middle, and found it had two North Poles, one at each End, and the Middle a South Pole.

Further, beginning to rub from the Middle towards each End of another Piece of Steel, I found it to have at each End a South Pole, and in the Middle a North Pole.

I have put a pretty heavy Compaſs-Needle after I had given it its Vertue, into the Fire, and made red hot three times one after another, letting it grow cold every time: It loſt ſome Vertue every Heat, but at the third it had a great deal ſtill left, and making it for the fourth time white hot, it loſt it all.

When

When I covered the Anvil with a Piece of Woollen Cloth, and the End of the Iron Bar with a Piece of Shamoy Leather, it gave no Vertue to the Steel: then covering only the Bar, and leaving the Anvil uncovered, it gave not any Vertue that way neither: But covering the Anvil, and leaving the Bar uncovered, it gave the full Vertue.

I have tried whether my Vice had any fixed Pole by ſtanding long in one Poſition, but I found it had not.

I have tried to do this with an Anvil of about 30 ℔ Weight, being fixed in Wood; but could not come up to the other Proofs.

I believe if one took an Iron Bar of three Inches ſquare, and 10 or more Feet long, or ſeveral of them upon each other, and a ſuitable Piece or Bar of Iron to rub withal, and giving the under Part of the ſtanding Bar the Figure aforeſaid, repreſented by B, it might be brought to a vaſt Strength. *N. B.* The Steel for the Needles is always of a Spring-Temper.

I have made two Pieces of Iron, at one End $\frac{3}{4}$ of an Inch, and ſo Taper to $\frac{1}{4}$ of an Inch ſquare each [*the Length was not mentioned*] and fixed theſe two Pieces of Iron to a Piece of Wood in the Shape of an armed Loadſtone, at about 8 Inches one from the other, applying to the under Part of theſe Irons, or Legs, a Piece of Iron with a Hook to it, as to an armed Loadſtone. I hung this armed Piece of Wood with each Leg over an Iron Bar (at a Diſtance that ſomething might hang between them) then placed the Piece of Iron with the Hook to it to the two Feet, and I found it to draw very ſtrongly; but my Trial was but with ſmall Tools. I ſuppoſe if one did this in a larger Proportion, I doubt not but it would have a great Effect.

Having

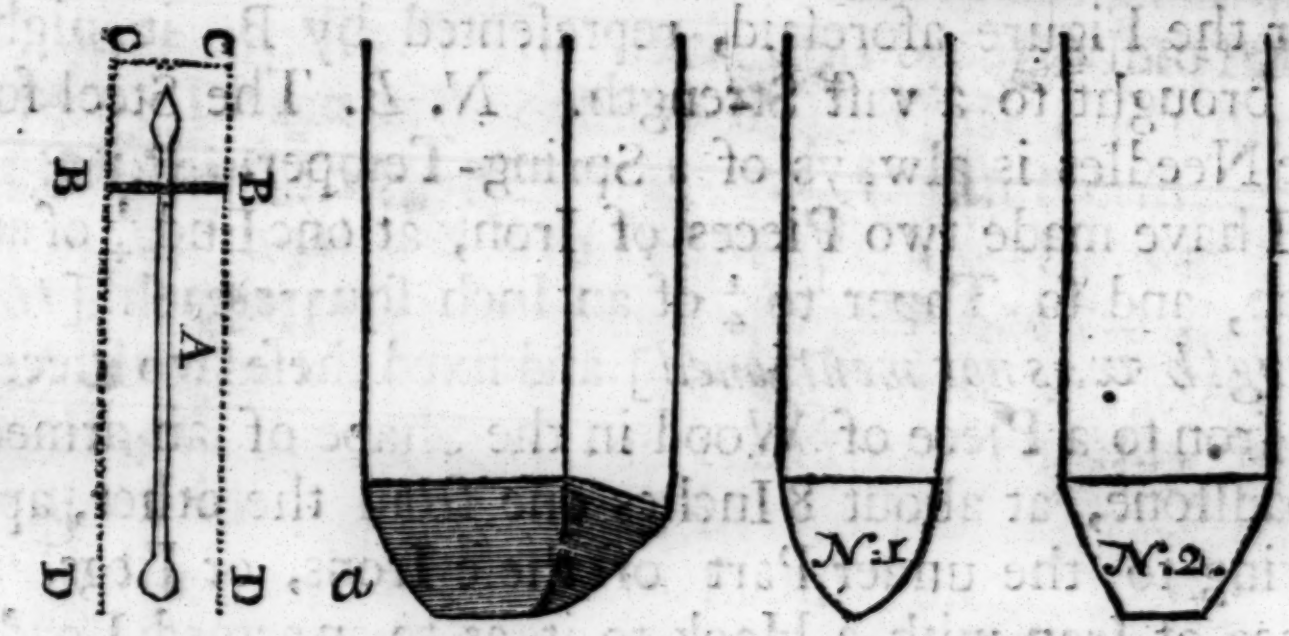
Having ground ſome Loadſtones with Emmery, I have ſaved the Grindings, and mixing them with Water, ſo that they might eaſily be moved; I put them into a Bottle to ſink, placing on each Side a Loadſtone, one with its North, and the other with its South Pole towards the Bottle, and found, after the Matter was ſettled and dried, it formed itſelf into a Sort of Loadſtone, which had a moderate Strength, and two regular Poles.

I have found ſeveral Niceties in arming of Loadſtones; but not to be tedious, I ſhall herewith conclude; not doubting but that if I have diſcovered any thing, yet unknown, you will own or record me to be the Inventor of it. I am, with humble Reſpects,

GENTLEMEN,

Your moſt humble Servant,

Arnold Marcel.



a the End of the Iron Bar, with which the Vertue is rubbed into the Steel or Iron.

N° 1. the Figure of the Point, on one Side.

N° 2. The Figure of the Point, on the other Side.

A The Needle of a Compaſs.

B B The End or Edge of the Bar, with which the Needle is rubbed, beginning at

C C, and proceeding to D D.

F I N I S.

Numb. 424.

PHILOSOPHICAL TRANSACTIONS

For the Months of *July*, and *Auguſt*, 1732.

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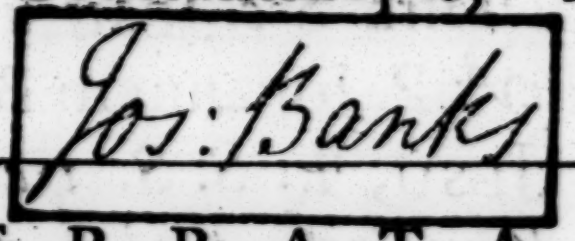

ERRATA.

NUMB. 423. for *Phlioſophical* read *Philoſophical.* Numb. 424. p. 316. for *excarpta* r. *excerpta.* Ibid. for *Perkini* r. *Pekini.* P. 319. l. ult. for *Auſtrium* r. *Auſtrum.* P. 320. l. 15. dele *H.*

LONDON:

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MDCCXXXII.

I. *An Extract from the Minutes of the* Royal Society, March 16, 1731, *containing an uncommon Case of a* Diſtempered Skin, *by* John Machin, *Sec. R. S. & Prof. Aſtr.* Greſh.

A Country Labourer, living not far from *Euſton-Hall* in *Suffolk*, ſhewed a Boy (his Son) about Four teen Years of Age, having a cuticular Diſtemper, of a different Kind from any hitherto mentioned in the Hiſtories of Diſeaſes.

His Skin (if it might be ſo called) ſeemed rather like a duſky coloured thick Caſe, exactly fitting every Part of his Body, made of a rugged Bark, or Hide, with Briſtles in ſome Places, which Caſe covering the whole excepting the Face, the Palms of the Hands, and the Soles of the Feet, cauſed an Appearance as if thoſe Parts alone were naked, and the reſt cloathed. It did not bleed when cut or ſcarified, being callous and inſenſible. It was ſaid he ſheds it once every Year, about Autumn, at which Time it uſually grows to the Thickneſs of three Quarters of an Inch, and then is thruſt off by the new Skin which is coming up underneath.

It was not eaſy to think of any Sort of Skin, or natural Integument, that exactly reſembled it. Some compared it to the Bark of a Tree; others thought it looked like Seal-Skin; others like the Hide of the Elephant, or the Skin about the Legs of the Rhinoceros; and ſome took it to be like a great Wart, or Number of Warts uniting and overſpreading the whole Body. The briſtly Parts, which were chiefly about the Belly and Flanks, looked and ruſtled like the Briſtles, or

Quills, of an Hedge-Hog, ſhorn off within an Inch of the Skin.

His Face was well featured, and of a good Complexion, if not rather too ruddy; and the Palms of his Hands were not harder, or in worſe Condition than is uſual for Workmen or Labourers. His Size was proper for his Age; his Body and Limbs ſtreight, and, excepting as to this Deformity, well ſhapen.

This rugged Covering gave him no Pain or Uneaſineſs, unleſs that ſometimes after hard Work, it was apt to ſtart and cleave, and cauſe a Bleeding. And notwithſtanding the unuſual Diſpoſition of his Humours to form ſo ſtrange an Integument, his natural Excretions were ſaid to be in the ordinary Courſe and Manner, without any thing remarkable attending them.

The Father knew of no Accident to account for this diſtempered Habit. But ſaid that his Skin was clear at his Birth as in other Children, and ſo continued for about ſeven or eight Weeks, after which, without his being ſick, it began to turn yellow, as if he had had the Jaundice; from which by degrees it changed black, and in a little time afterwards thickned, and grew into that State it appeared in at preſent. That he has been in Health from his Birth, and hath no Sickneſs at the Seaſon when he ſheds it. He further ſaid, that his Mother had received no Fright, to his Knowledge, whilſt ſhe was with Child; and hath born him many other Children, none of which have ever had this, or any other unuſual Diſtemper or Deformity.

TAB. I. Fig. 1. *Repreſents the Back of the Boy's Hand.*

Fig. 2. *Repreſents a Portion of this extraordinary*

TAB. I.

Fig. 3.

Fig. 1.

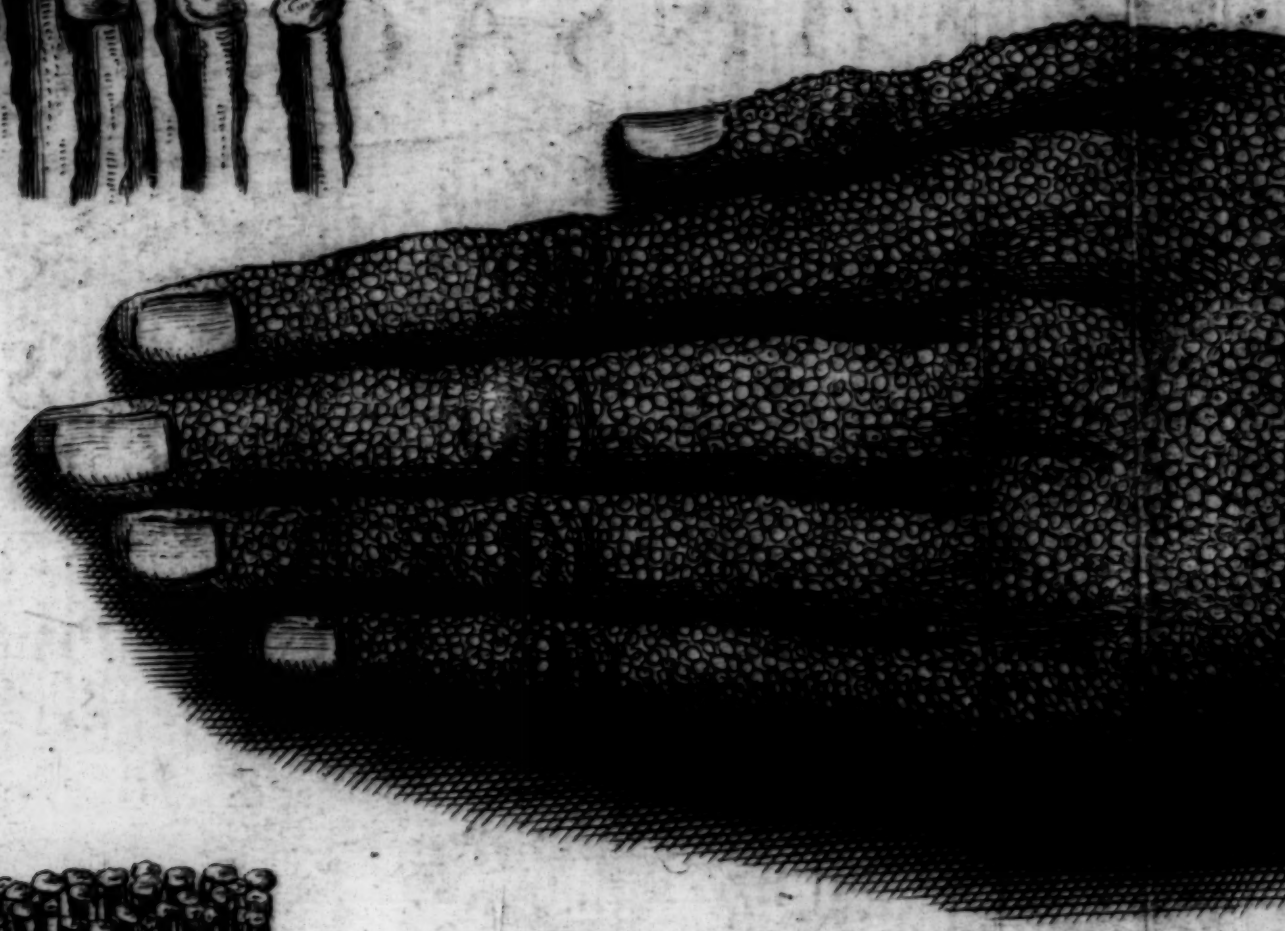


Fig. 2.

TAB. II.

Fig. 1.

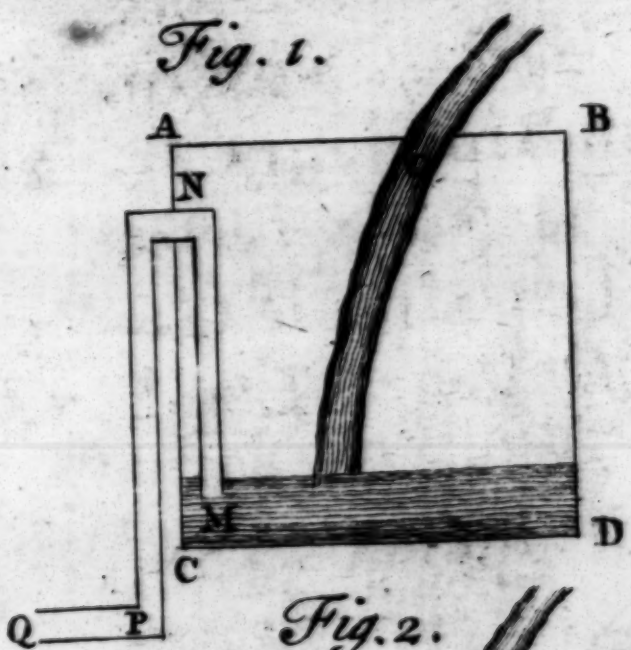


Fig. 2.

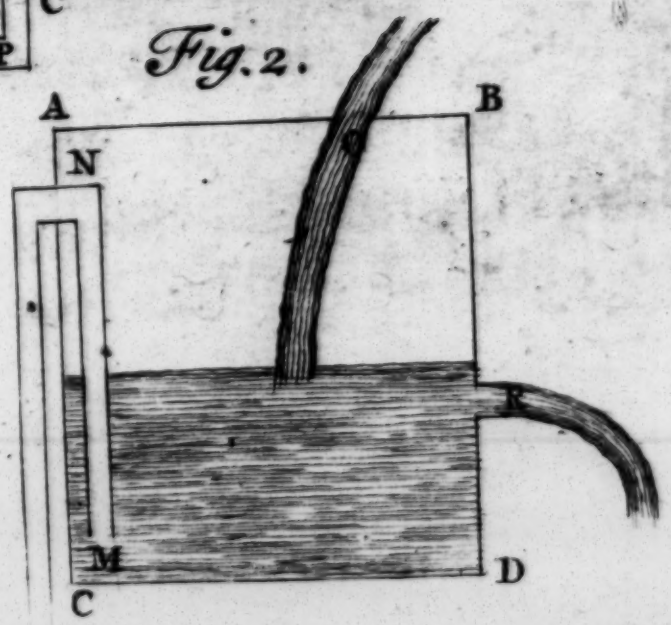


Fig. 3.

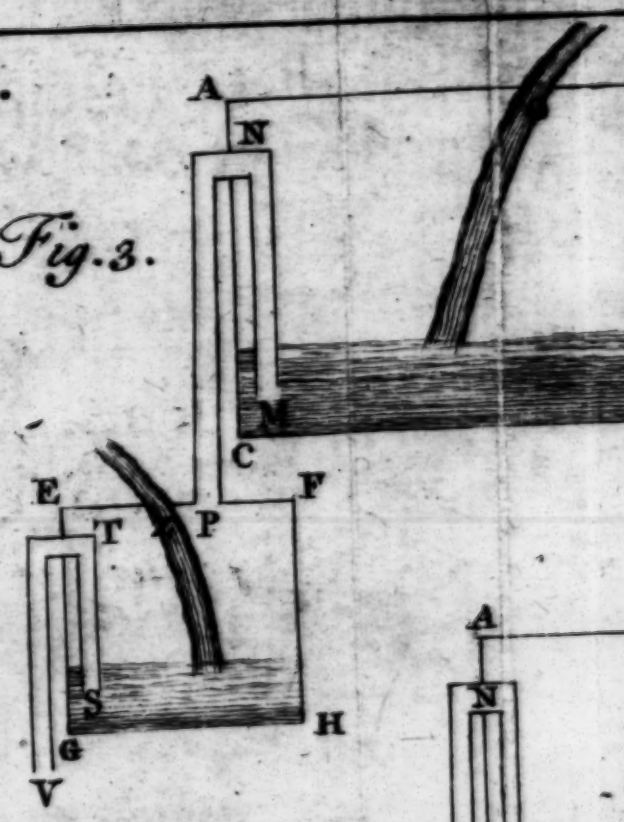


Fig. 4.

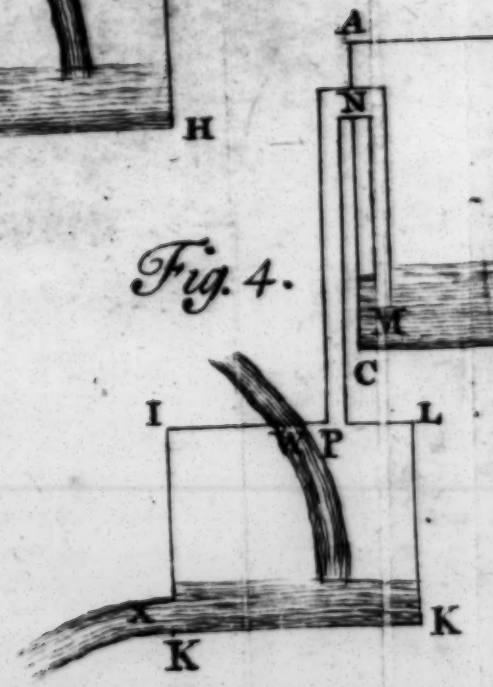
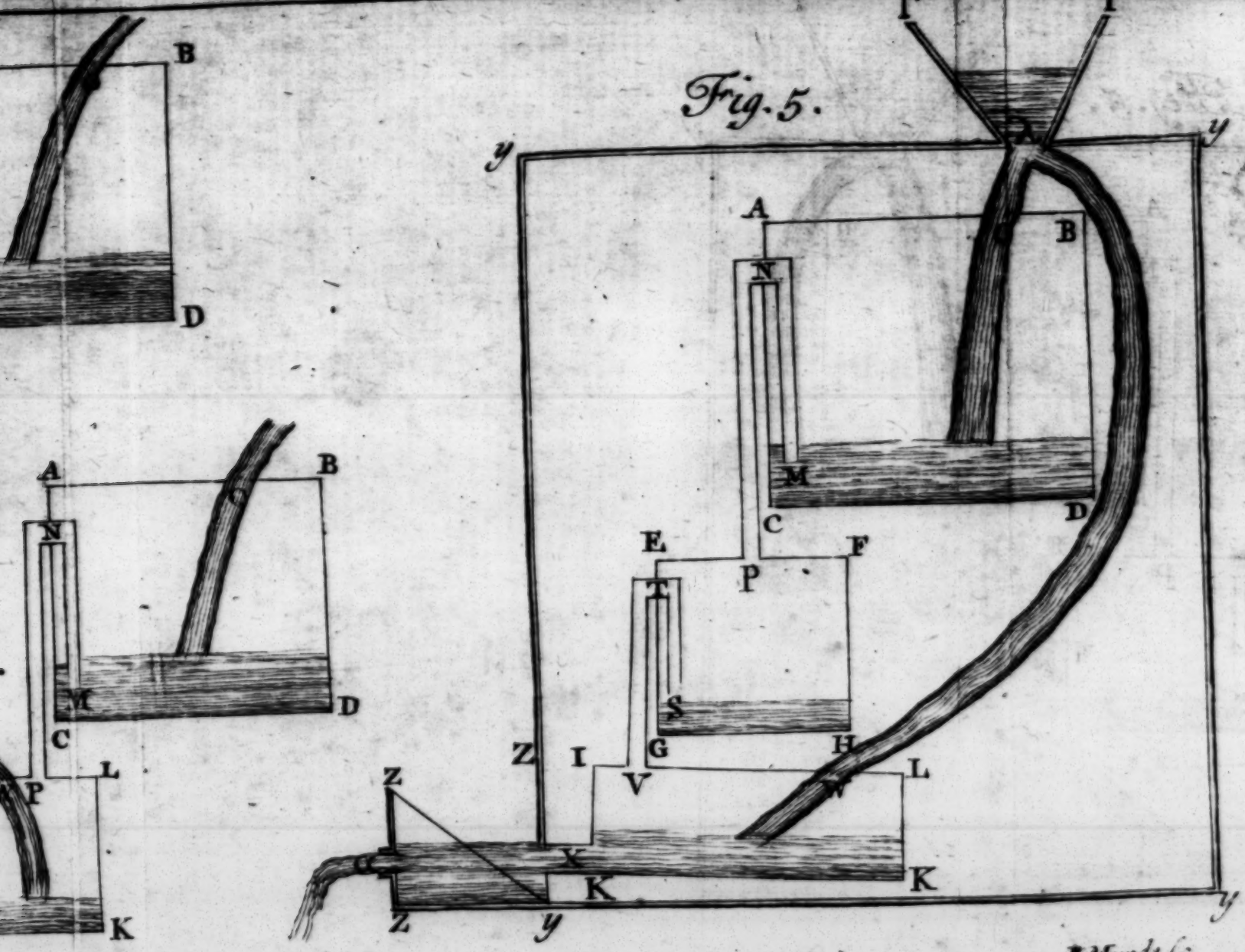


Fig. 1.

C. M. ad viv. delin.



Epidermis, *which was probably a Prolongation of the Nervous* Papillæ *grown to about the Size of common Twine Packthread; and theſe ſtanding as cloſe together as the Briſtles in a Bruſh, ſeemed, like them, to be all ſhorn off even, and of the ſame Length,* viz. *about half an Inch above the Skin.*

Fig. 3. *Shews ſome of theſe Briſtles, or Stumps, magnified; where it is viſible that ſome of them are flat at Top, others concave; ſome pointed like a Cone, and others very irregular.*

II. *Conjectures upon the Nature of* Intermitting *and* Reciprocating Springs. *By Mr.* Joſeph Atwell, *F. R. S.*

BEFORE I offer the following Thoughts to the Conſideration of the *Society*, I beg leave to premiſe ſomething upon the Nature of Philoſophical Conjectures in general, and the Senſe in which I would be underſtood to propoſe theſe in particular.

A juſt and ſatisfactory Account of any one Phænomenon in Nature, cannot be expected without a true and perfect Hiſtory of the Fact. This is ſeldom to be met with: Thoſe who live neareſt the Place of any natural Curioſity, and have the beſt Opportunity of making proper Obſervations upon it, ſeldom regard what Time and Uſe have rendered familiar. On the other hand, Strangers and Travellers, inclined to make a better Enquiry into things of this Kind, are too often, if not always, in want of Time,

as well as other Conveniencies, for acquiring a due Knowledge of the Thing; and therefore they content themſelves with ſome ſlight Obſervations of their own, ſupplying the reſt from the common, but generally fabulous, Reports of the Neighbourhood. Add to this, that a ſtrong Propenſity in Mankind towards the Marvellous, with the Surprize uſually attending uncommon Sights, often hinders Men from ſeeing Things in a true Light; and even ſometimes impoſes upon them ſo far, as to make them report things under Circumſtances abſolutely falſe.

Every curious Perſon can, I believe, furniſh himſelf with Inſtances of theſe Truths, from his own Obſervations compared with the Accounts of others: But nowithſtanding ſo weak a Foundation for raiſing Philoſophical Conjectures, they will ſtill have their uſe, if they are not impoſed upon the World for Accounts of things certain, to be entirely acquieſced in. Let them be modeſtly offered as meer Hypotheſes ſubmitted to a farther Examination, and then their Conſequences will be ſo many Particulars, which, being carefully examined and compared with the Phænomena themſelves, may ſerve to refute, correct, or confirm the ſaid Hypotheſes, from whence they were deduced.

It is in this Senſe only, and with ſuch a View, that I offer the following Conjectures upon the Subject of intermitting and reciprocating Springs. For though theſe Thoughts were ſuggeſted to me by the Phænomena of a particular Fountain, ſeen by my ſelf this laſt Winter, yet I am ſenſible that my Obſervations made on it are very imperfect, in Compariſon of what the *Society* may expect and I my ſelf hope hereafter

to

to give them: And as the Conjectures were framed chiefly for my own uſe, againſt another Opportunity of obſerving this Fountain more carefully; ſo they are now communicated only for the uſe of others, who may perchance find ſuch an Opportunity before me. Theſe Obſervations will however diſcover ſomething of the Nature of this Spring not yet imparted to the *Society*, nor taken notice of by the Naturaliſts, ſo far as I know, in any other Spring whatſoever. But ſince they are few, and imperfect, I ſhall be more particular in my Relation of them, that no greater Streſs may be laid on them than they deſerve.

The Spring is ſituated at one End of the Town of *Brixam* near *Torbay* in *Devonſhire*, and is known by the Name of *Laywell*. It is a long Mile diſtant from the Sea, upon the North and North-Eaſt Side of a Ridge of Hills lying between it and the Sea, and making a Turn or Angle near this Spring. It is ſituated in the Side of thoſe Hills, near the Bottom, and ſeems to have its Courſe from the South-Weſt towards the North-Eaſt. There is a conſtantly running Stream which diſcharges itſelf near one Corner into a Baſon about eight Foot in Length, and four Foot and a half in Breadth; the Outlet of which is at the fartheſt End from the Entrance of the Stream, about three Foot wide, and of a ſufficient Height. This I mention, that a better Judgment may be made of the perpendicular Riſe of the Water in the Baſon, at the time of the Flux or Increaſe of the Stream. Upon the outſide of the Baſon are three other Springs, which always run, but with Streams ſubject to a like regular Increaſe and Decreaſe with the former. They

ſeem

ſeem indeed only Branches of the former, or rather Channels diſcharging ſome Parts of the conſtantly running Water, which could not empty itſelf all into the Baſon; and therefore when by means of the Seaſon, or Weather, Springs are large and high, upon the Flux or Increaſe of this Fountain ſeveral other little Springs are ſaid to break forth, both in the Bottom of the Baſon, and without it, which diſappear again upon the Ebb or Decreaſe of the Fountain. All the conſtantly running Streams put together, at the time that I ſaw them, were, I believe, more than ſufficient to drive an Overſhut Mill; and the Stream running into the Baſon, might be about one half of the whole.

I had made a Journey purpoſely to ſee it, in Company with a Friend. When we came to the Fountain, we were informed by a Man, working juſt by the Baſon, that the Spring had flow'd and ebb'd about twenty times that Morning; but had ceas'd doing ſo, about half an Hour before we came. I obſerved the Stream running into the Baſon, for more than an Hour by my Watch, without perceiving the leaſt Variation in it, or the leaſt Alteration in the Height of the Surface of the Water in the Baſon; which we could obſerve with great Nicety, by means of a broad Stone laid in a ſhelving Poſition in the Water. Thus diſappointed, we were obliged to go and take ſome little Refreſhment at our Inn; after which we intended to come back and ſpend the reſt of our Time by the Fountain, before we returned Home. They told us in the Town, that many had been diſappointed in this manner; and the common People ſuperſtitiouſly imputed it to I know not what Influence which the Preſence of ſome People had over the Fountain; for

for which reaſon they adviſed, that in caſe it did not flow and ebb when we were both preſent, one of us ſhould abſent himſelf, to try whether it would do ſo in the Preſence of the other.

Upon our Return to it, the Man, who was ſtill at work, told us, that it began to flow and ebb about half an Hour after we went away, and had done ſo ten or twelve times. In leſs than a Minute, we ſaw the Stream coming into the Baſon, and likewiſe the others on the outſide of the Baſon, begin to increaſe and to flow with great Violence; upon which the Surface of the Water in the Baſon roſe an Inch and a quarter perpendicularly, in near the Space of two Minutes: Immediately after which, the Stream began to abate again to its ordinary Courſe; and in near two Minutes time the Surface was ſunk down to its uſual Height, where it remained near two Minutes more. Then it began to flow again as before; and in the Space of twenty-ſix Minutes flow'd and ebb'd five times: So that an Increaſe, Decreaſe and Pauſe, taken together, were made in about five Minutes, or a little more.

I could obſerve by the Mark upon the Stones, that the Surface of the Water in the Baſon had roſe before we came at leaſt three Quarters of an Inch perpendicularly higher than when we ſaw it; and I thought that I could perceive ſome very little Abatement each Turn, both in the Height, and in the Time of the riſing of the Surface, and conſequently in the Time of its ſinking; but the Time of the Pauſe, or ſtanding of the Surface at its uſual Height, or equable running of the Stream, was lengthened; yet ſo, as to leave ſome Abatement in the time of the riſing, ſinking,

ſinking, and Pauſe taken together. This is all which my ſhort Time would allow me to obſerve; many more things ſhould have been taken notice of, as will appear from the Hypotheſis propoſed to explain theſe Phænomena.

But before I enter upon explaining that Hypotheſis, I muſt remark what Difference or Agreement is to be found between this Account of the Fountain, and another publiſhed in the *Philoſ. Tranſ.* Numb. 204, *p.* 909, 910, in two Letters from Dr. *Oliver* to *Walter Moyle*, Eſq;. The Doctor places it a Mile and half from *Brixam*: I ſuppoſe he means *Brixam-Quay*, which is more than a Mile off from the Town. He gives the Dimenſions of the Baſon a little different from mine, making the Surface of it thirty Foot ſquare, whereas I make it thirty-ſix Foot. He ſays, that it ebbs and flows very often every Hour; which is certainly falſe, as appears both by common Report, and by my own Obſervation. When it once begins indeed to flow and ebb, it continues to do ſo ſeveral times in an Hour; but then there is after this again a certain Space of Time, perhaps two Hours or more, when it runs with an equable Stream, without any the leaſt Variation: And this is a particular Circumſtance not obſerved in any Spring whatſoever that I have heard of. When the Doctor firſt ſaw it, *viz.* in *July* 1693, he ſays that he judged the Flux and Reflux, as he calls them, to be performed in about two Minutes: If he means two Minutes each, it agrees very well with my own Obſervations; but as he had neither Glaſs nor Minute-Watch with him, this Obſervation cannot be depended on. When he ſaw it again, *viz.* in *Auguſt* the ſame Year, he judged it to flow ſlower than before;

before ; which he explains by ſaying, that though it performed its Flux and Reflux in little more than a Minute (which by the way is quicker than before) yet it would ſtand at the Low-Water Mark two or three Minutes ; which I ſuppoſe he calls flowing ſlower than before, becauſe the Space of Time between the End of the Ebb and the Beginning of the ſucceeding Flux was longer. I had never read this Account 'till lately ; long ſince my own Obſervations were made ; but, if we ſuppoſe the Doctor to have made his Obſervations ſomewhat nearer the Time when the Fountain was to ceaſe ebbing and flowing, than I made mine, our Obſervations will perhaps exactly agree : The Time of the Flux and Reflux being ſhorter, the Time of the Pauſe longer, but the whole Time of the Flux, Reflux, and Pauſe taken together being ſhorter by his Account than by my own. He ſays, that he found it by his Watch to flow and ebb ſixteen Times in an Hour : I do not ſuppoſe that he made a whole Hour's Obſervations, which muſt have ſhewn him a Difference in the Times of the Reciprocations that he did not perceive ; but having obſerved, that one Reciprocation, or a Flux, Reflux, and Pauſe, took up about the Space of four Minutes, he from thence computed, as I imagine, that there would be ſixteen in an Hour, preſuming that there was no Alteration in the Times. In this ſenſe I would underſtand him, when he adds, that he was informed it ſometimes flowed twenty Times in an Hour. For, according to his Obſervations, it flowed at the rate of ſixteen Times in an Hour ; according to my own Obſervations, at the rate of twelve Times in an Hour ; perhaps before my Obſervations at a leſs Rate, and after his at a greater : So that in the whole Hour, according to the ſeveral Rates taken together, it may flow

and ebb about nine or ten Times, according to another Account which I have received; but of this I can assert nothing certain, or upon my own Observations. The Doctor adds, that when the Water in the Bason began to rise, he observed a Bubbling in the Bottom of the Bason, which ceased when the Water began to sink. This I did not see, because the Springs were small and low, by means of a dry Season; but it was confirmed to me by the Report of Eye-witnesses, as is before observed.

Having thus compared the two Accounts given of this Fountain, I come now to my Hypothesis, for explaining the Phænomena observed by me; and I imagine them to be occasioned by two Streams or Springs, one of which passing through two Caverns or natural Reservoirs with Syphons, meets with the other Stream in a third Reservoir without a Syphon; where being joined, they come out of the Earth together. This complicated Piece of Machinery will be best understood by beginning with an Explanation of the more simple Parts first; in doing of which, we shall have an Opportunity of considering some other Sorts of Fountains, which have already been observed, or may hereafter be found to be in Nature.

The *Petitio Principii*, or Supposition of Reservoirs and Syphons in the Bowels of the Earth, has been made by others: *Père Regnault*, in his *Phil. Conversations*, Vol. 2. Conv. 6. *p.* 125, &c. *Eng. Edit.* has mentioned it in general, and Dr. *Desaguliers*, in *Phil. Trans.* Numb. 384, has attempted to apply it to two Cases in particular; as *Dechales*, Tract. xvii. *de Fontibus Naturalibus*, &c. Prop. xv. had done in two other Cases before him. Nor is it unnatural or hard to be granted. Whosoever has seen the *Peak* of

Derbyſhire, the Hilly Parts of *Wales*, or other Countries, muſt be ſatisfied that they abound with Caverns of many ſorts. Some of them are dry, others ſerve only for Paſſages, or Channels to Streams, which run through them; and a third Sort collect and hold Water, 'till they are full. They muſt likewiſe have obſerved, that there are ſometimes narrow Paſſages running between the Rocks which compoſe the Sides, and going from one Cavern to another. Such a Paſſage, of whatſoever Shape or Dimenſions, how crooked and winding ſoever in its Courſe, if it be but tight, and runs from the lower Part of the Cavern, firſt upwards to a leſs Height than that of the Cavern, and then downwards below the Mouth of the ſaid Paſſage, will be a natural Syphon.

A natural Reſervoir then, TAB. II, *Fig.* 1. ABCD, with ſuch a natural Syphon, MNP may be ſuppoſed. Let a Stream, which I ſhall call the Feeding-Stream, enter it, near the Top at O. The ſaid Cavern muſt contain all the Water which comes in at O, 'till it is filled to the Top of the Syphon at N. Then the Syphon beginning to play, and being ſuppoſed always to diſcharge more Water than comes in by the Feeding-Stream at O, will empty the Cavern, 'till the Water is ſunk in it below the Mouth of the Syphon at M; when it muſt ſtop, 'till the Cavern is filled, and the Syphon runs again as before. If the Water diſcharged by ſuch a Syphon, MP be brought out of the Earth by a Channel PQ, the Water will flow out of the Earth, and ſtop alternately, making an intermitting Fountain at Q.

By this plain and eaſy Contrivance, ſeveral of the flowing and ebbing Springs obſerved by the Naturaliſts, may probably be explained; and even a much greater Variety of them than is hither-

to known. For if the Feeding-Stream at O ſhould ariſe only from the Rains in Winter, or from the melting of the Snow in Summer, the intermitting Fountain would become a temporary Spring, as Dr. *Plot* calls ſuch Springs which are confined to a Seaſon. Or if the Feeding-Stream at O ſhould be conſtant, but yet liable with other Springs to an Encreaſe and Decreaſe ariſing from the Seaſons, Weather, or other Cauſes, the Conſtruction of the Syphon would make a great Alteration. For when the Syphon is ſo made, that its Diſcharge (which is continually decreaſing, as the Surface of the Water ſubſides in the Cavern) ſhall at any Time be equal to the Feeding-Stream entering at O, in ſuch a Caſe, the Syphon muſt continually run, and yet not empty the Cavern, 'till the Feeding-Stream at O is ſufficiently diminiſhed. But, when the Diameter of the Syphon at N, according to the Height of the Cavern, is ſo great, and the Feeding-Stream at O ſo ſmall, that the Syphon can carry off (in the Manner of a Waſte-Pipe) all the Water which comes in, and yet not run with a full Stream; the Syphon muſt then continue to run without emptying the Cavern, 'till the Feeding-Srream at O is ſufficiently enlarged. So that by theſe different Conſtructions of the Syphon, there may be ſome Fountains which ſhall flow conſtantly in the Winter, or a wet Seaſon, and intermit in the Summer, or a dry Seaſon; and on the contrary, others which ſhall flow continually in the Summer, or a dry Seaſon, and intermit in the Winter, or a wet Seaſon. There is a third Variety, which may ariſe from the Make of the Syphon, and will occaſion ſuch Irregularities as admit of no certain Explanation. This happens when the Diſcharge of the Syphon at the very laſt is juſt equal to the Feeding-Stream, and the Cavity of the Syphon at N

is

is large; for in this Caſe, the Air-Bubbles, made by the Fall of the Feeding-Stream from O to the Bottom of the Cavern, will ſometimes accidentally get into the Mouth of the Syphon at M, and lodging at N, will ſo choak it as to render its running and ſtopping, as well as the Quantity of its Diſcharge, entirely uncertain; ſo that theſe ſort of Fountains will admit of no farther Conſideration.

But before I leave the Conſideration of Fountains explicable by one Refervoir and Syphon, it may not be amiſs to obſerve, that thoſe which intermit regularly will have their Flux always longer, and their Pauſe or Intermiſſion ſhorter in Winter and in wet Weather, than in Summer or in a dry Seaſon; which is a Conſequence of this Hypotheſis, by which it may be examined, whether it be applicable to any particular intermitting Fountain, or not.

If the ſingle Reſervoir and Syphon has another Out-let at R, *Fig.* 2. ſituated between the Bottom C D of the Cavern, and the Top of the Syphon N, we ſhall have another kind of Fountains. For if the Feeding-Stream at O, is capable of being diſcharged by the Out-let at R, a Fountain derived from R will continually run, whilſt the Feeding-Stream can be diſcharged that Way, and will encreaſe and decreaſe with any little Alteration happening to the Feeding-Stream at O, provided that the ſaid Stream does not grow too large for the Out-let at R. But in that Caſe the Cavern muſt be filled up to N, and the Syphon may begin to play; which, together with the Out-let at R, may diſcharge ſo much as to make the Surface of the Water in the Cavern ſink below R, and conſequently the Fountain proceeding from R muſt ſtop. If the Diſcharge of the Syphon is ſo great as to empty the Cavern, then the Fountain

derived

derived from R will, after ſome time, begin to run again, and encreaſe 'till the Water riſes in the Cavern to N; after which it will decreaſe, and at length ſtop. But if the Diſcharge of the Syphon only keeps the Surface of the Water below R, without emptying the Cavern, then the Fountain derived from R ſhall be dried up, ſo long as the Stream at O continues encreaſed; and ſhall run again when the ſaid Feeding-Stream is leſſened. Thus we may have a Spring which ſhall run all Summer, and be dry all Winter: Such a Spring will encreaſe juſt before it begins to fail, *i. e.* whilſt the Water in the Cavern is riſing to N, will be dried up ſooner in a wet Summer, and break out later in a wet Winter, contrary to the Nature of other Springs. Which Particulars are worthy of Obſervation in ſuch ſort of Springs (of which it is ſaid we have ſome in *England*) and will ſerve to diſcover, whether they are occaſioned by this kind of Machinery, or not.

If the Syphon *Fig.* 3. MNP, of the Reſervoir ABCD, having no Out-let at R, ſhould diſcharge itſelf into a ſecond Reſervoir EFGH of a ſmaller Capacity, but furniſhed with a Syphon STV, which diſcharges the Water more plentifully than it comes in; a Fountain derived from this ſecond Syphon STV would flow and intermit, whilſt the firſt Syphon MNP continued running; *i. e.* 'till the great Reſervoir ABCD ſhould be emptied. After which it would entirely ſtop, 'till the ſaid Reſervoir ABCD was filled again by the Feeding-Stream at O, and then it would flow and intermit as before.

Such a Sort of compound Fountain would be liable to all the Variations of the former Fountains derived from a ſingle Reſervoir, if we take the Fits of flow-

ing

ing and intermitting of this for the Flux of the former, and the long Stop in this, whilſt the great Reſervoir is filling, for the Pauſe or Intermiſſion of the former. Beſides which, we muſt remark, that as the Flux in the former Fountains may be changed, and be made longer or ſhorter; ſo in this, the Number of Intermiſſions during one Fit of flowing and intermitting may not always be the ſame, becauſe of the different Capacities of the two Reſervoirs, and a Difference or Change occaſioned in the Feeding-Stream at O. For if, whilſt the great Reſervoir A B C D is emptying, the little Reſervoir E F G H ſhould empty itſelf nine times, for Inſtance, and be half full again, the Fountain derived from its Syphon S T V muſt have nine Intermiſſions in one Fit, and ten in another, alternately, whilſt the Feeding-Stream at O remains the ſame. But the Feeding-Stream at O being leſſened or enlarged, without making the Syphon M N P run continually, the Number of Intermiſſions in each Fit will be diminiſhed or augmented accordingly. But 'tis peculiar to this laſt Sort of Fountains, that in each Fit of flowing and intermitting, the firſt Flux will be larger and longer than the ſecond, and the ſecond than the third; but the firſt Intermiſſion will be ſhorter than the ſecond, and the ſecond than the third: becauſe the Syphon M N P running faſter at firſt than at laſt, the Reſervoir E F G H muſt be a ſhorter Time in being filled, and a longer Time in being emptied the firſt Time than the ſecond; the ſecond than the third, and ſo on. As to the whole Time of the firſt Flux and Intermiſſion, in Compariſon of the whole Time of the ſecond Flux and Intermiſſion, it is a Particular, requiring ſo many Things to be taken into Conſideration, for determining it in each

each Caſe, that I ſhall wave it here, and content myſelf with ſhewing that it may be longer, by an Experiment that will preſently be made. Another Variety in this Sort of Fountains might be made by a ſecond Feeding-Stream Z, coming into the ſecond Reſervoir E F G H; but the bare mentioning of that will at preſent be ſufficient.

If in the Contrivance of a ſingle Reſervoir and Syphon, the Stream derived from the Syphon ſhould fall into another Reſervoir *Fig.* 4. I K K L, having no Syphon, but only a common Out-let X, and ſhould in this Reſervoir meet and join with another Stream conſtantly running, a Fountain derived from the ſaid Out-let X would be a Reciprocating-Spring; by which Name I call thoſe Springs which flow conſtantly, but with a Stream ſubject to encreaſe and decreaſe, to diſtinguiſh them from Intermitting-Springs, which flow and ſtop alternately. And if the Out-let X be too ſmall to carry off all the Water brought into the Reſervoir I K K L, by the Syphon, over and above what is brought in by the conſtantly running Stream W; then the Surface of the Water in the ſaid Reſervoir I K K L muſt continually riſe, 'till the Velocity of the Stream going out at X, is ſufficiently encreaſed, to carry off the Water coming in: Upon which, the Diſcharge of the Syphon being continually leſſened, the ſaid Surface will again ſubſide, and the Velocity of the Stream at X will diminiſh; ſo that both the Encreaſe and Decreaſe in this Reciprocating-Fountain will be gradual. Beſides, if the Reſervoir I K K L, or the Channel derived from it, ſhould have any Leaks, Crevices, or other Out-lets, the Water will iſſue through them upon the Riſing of the Surface in the ſaid Reſervoir, and occaſion Springs, which will ceaſe again when the Surface ſubſides.

Let

Let us now ſuppoſe ſuch a Reſervoir *Fig.* 5. I K K L, with a conſtantly running Stream W, and an Out-let X, to receive the Water of a Syphon S T V, coming through two Reſervoirs A B C D and E F G H, as before deſcribed. A Fountain derived from X in this Caſe, would be an intermitting Reciprocating-Spring, whoſe Stream would reciprocate, but whoſe Reciprocations would ſometimes ſtop, and have Fits of Intermiſſion.

Such, in all probability, is the Fountain called *Laywell*, before deſcribed, whoſe Phænomena gave occaſion to theſe Thoughts, and ſeem capable of being accounted for by ſuch a Contrivance. And for the better Diſcovery of the Nature of this Fountain, whether it is owing to ſuch a Piece of Natural Machinery, or otherwiſe, it would be proper to obſerve the length of Time of each Increaſe, Decreaſe, and Pauſe in every Reciprocation, together with the Number of Reciprocations in every Reciprocating-Fit, and likewiſe the length of the Intermiſſions of the ſaid Fits. Theſe Obſervations ſhould be continued for ſome Time, both in a ſettled Seaſon, when the Feeding-Stream at O cannot change, and in Variety of Seaſons, when the ſaid Stream may be altered.

Having now brought theſe Thoughts to the End propoſed, *viz.* an Explanation of ſuch a Fountain as *Laywell*, I ſhall carry them no farther; but conclude, by preſenting to the View of the *Society*, an artificial Fountain of this kind, *Fig.* 5. which being very eaſily made, may be buried in the Bottom or Slope of a Terraſs, where a conſtant Stream of Water can be brought, and will furniſh us with a new ſort of Water-Works in Gardens. The two Reſervoirs A B C D, E F G H, with their Syphons M N P, S T V, and the

third Reſervoir IKKL, with its Out-let X, are included in a Box YYYY. Into this Box at λ enters a Funnel ΓλΓ divided within the Box into two Pipes, *viz.* λO, which ſerves for a Feeding-Stream to the great Reſervoir, and λW, which ſerves for a conſtant Stream to the third Reſervoir. A Stream of Water being let into the Funnel ΓλΓ, will diſcharge itſelf like ſuch an intermitting Reciprocating-Fountain at X, where there is a Baſon YZZZ without the Box to receive it; with an Out-let α, and a Diagonal Gage ZY, to mark the Riſe and Fall of the Water in the Baſon.

III. *Immerſiones, atque Emerſiones Satellitum* Jovis *Obſervatæ* Perkini *à P. P.* Ignatio Kegler, & Andrea Pereira, *Soc.* JESU, *a menſe* Novem. 1730, *ad Rev^d.* P. Johannem Baptiſtam Carbone, *Soc.* JESU, *R. S. S. tranſmiſſæ; et ex ejuſdem Cl. Viri Epiſtolâ ad* Jacobum de Caſtro Sarmento, *M. D. Col. Medic.* Lond. *L. & R. S. S.* excarptæ.

SATELL. I.

1730	Immerſiones	*Nov.*	3^d	18^h	00′	p. m.
			12	14	20	
			19	16	12	
			26	18	3	
		Dec.	5	14	22	54″
			12	16	11	30
			19	18	00	45

Dec.

1730	Immersiones	*Dec.*	21 d	12 h	28′	40″ I
			28	14	18	10
1731		*Jan.*	4	16	8	45
			6	10	35	20
			11	17	59	30
			13	12	2	10
			20	14	17	30
			27	16	10	12
		Feb.	3	1	2	36
			12	14	25	dub.
			14	8	54	20
		Mar.	2	9	30	
	Emersiones		9	11	27	40
			16	13	23	30
			18	7	52	40
		Apr.	1	11	45	20
			3	6	15	
			17	10	8	40
			24	12	4	30
		Mai	3	8	29	50

SATELL. II.

1730	Immersiones	*Nov.*	25	16	5	30
		Dec.	2	18	37	dub.
			20	12	49	45
			27	15	21	5
1731		*Jan.*	3	17	49	50
			14	9	30	45
			28	14	37	30
		Feb.	4	17	10	
			15	8	59	

1731	Emerſ.	*Mar.* 19d	11h	29′	20″
		Apr. 13	8	35	
		20	11	16	

SATELL. III.

1730	Immer.	*Nov.* 21	16	16	30
	Emer.	*Dec.* 20	11	27	50
	Immer.	27	11	49	30
	Emer.		15	21	17
1731	Immer.	*Jan.* 3	15	43	15
	Emer.		19	16	dub.
	Immer.	*Feb.* 8	11	25	30
	Immer.	15	5	23	
	Emer.	*Mar.* 9	6	50	30
	Emer.	16	10	50	50
	Emer.	23	14	31	30
	Emer.	*Apr.* 21	6	50	20
	Immer.	28	7	28	30
	Emer.		10	55	30
	Immer.	*Mai.* 5	11	30	30

SATELL. IV.

1730	Immer.	*Dec.* 20	18	50	45
1731	Immer.	*Jan.* 6	12	38	12
	Emer.		17	6	45
	Emer.	23	10	54	
	Immer.	*Mar.* 31	6 inter 30′ & 35′		
	Emer.		10	43	40

Die 14 *Nov.* 1730 circa hor. 4 p. m. Luna obtexit Martem. Immerſio, claro adhuc die, videri non potuit: obſervata tamen eſt Emerſio, quæ accidit hor. 4. 54′ proximè Furnerium.

Die

Die 17 *Jan.* 1731, Obſervatus eſt tranſitus Lunæ per Pleiadas, ut ſequitur.

H.	′	″	*p. M.*
10	9	40	Immerſit Electra in recta per Platonem, & Eudoxum.
10	32	52	Immerſit Merope — —— Copern. & Meſſallam.
10	38	15	Emerſit Electra —— —— Thaletem, & Eudoxum.
11	23	52	Immerſit præcedens lucidam Pleiadum (triplex Stellula) in recta per Eratoſth. & S. Cyrillum.
11	26	5	Immerſit lucida, ſeu Alcyone, Copern. & S. Cathar.
11	47	32	Emerſit Merope in recta per Tarunt. & S. Theophil.
12	1	10	Immerſit lucidior ex parvis ad Auſtrum Atlantis, in recta per Bulliald, & Cenſorinum.
12	12	12	Immerſit Atlas in recta per Copern. & Jul. Cæſar.
12	13	57	Emerſit Alcyone in recta per Marginem Orient. Poſſid. & Menelaum.
12	25	3	Immerſit Pleione in recta per Copern. & Ptolomeum.

1731, Die 14 *Mart.* ☾ occultavit Stellam ϰ in ♉ Immerſio accidit H. 8, 41′ 50″ *p. M.* in recta per Tatium, & Langrenum. Emerſit H. 9, 51′ a Firmico modicè ad Auſtrium.

Die

Die 20 *Mart.* ☾ occultavit Stellam π in ♌. Immersio fuit H. 11, 13′ *p. M.* in recta per Mersenum, & Bullialdum. Emersio H. 12, 31′ è regione Firmici.

Die 16 *April.* ☾ occultavit Stellam o, in ♌. Immersio fuit H. 8, 46′ 30′ *p. M.* in recta per Bulliald. & Censorin. Emersio H. 10, 5′ 45″ in recta per Taruntium, & Menelaum.

Eclipsis ☾ Die 29 *Julij.* 1730, *Pekini* ob densè nubilatum Cœlum non potuit observari. Eam tamen observavit *P. Phil. Jac. Simonelli* in urbe *Chamxo* in provinciæ *Nankinensis*, quæ *Pekino* ad ortum distat paulò plus 4 grad. Æquat. id est, 16 vel 17 min. temp. Initium Eclipsis ibi fuit H. 10, 55′ *p. M.* & finis H. 12, 49′, cum maxima obscuratione digitorum sinicorum H. 3, 10′. Itaque medium Eclipsis illic accidit H. 11, 52′, quod pro *Pekino* calculus dabat H. 11, 36′, cum differentia 16′ satis justa.

Eandem Eclipsim in Regia *Cochinchinæ* observavit *P. Franciscus de Lima.* Initium annotavit H. 9, 58′ *p. M.* & finem H. 11, 50′, adeoque medium ibi erat H. 10, 54′, unde exurgit differentia ejus Meridiani à *Pekino* ad Occid. 42′. temp. id est, 10° 30′ Æquat.

IV. A

IV. *A Catalogue of Eclipses of* Jupiter's *Satellites for the Year* 1733. *By* James Hodgson, *F. R. S. Master of the Royal Mathematical School at* Christ's Hospital, London.

Ecclipses *of the first Satellite of* Jupiter.

Immersions. D.	H.	M.	S.
		JANUARY.	
2	3	7	56
3	21	35	41
5	16	3	26*
7	10	31	12
9	4	59	1
10	23	26	54
12	17	54	48*
14	12	22	44
16	6	50	41
18	1	18	42
19	19	46	47
21	14	14	53*
23	8	43	2
25	3	11	15
26	21	39	31
28	16	7	50*
30	10	36	12
		FERUARY.	
1	5	4	37
2	23	33	00
4	18	1	25*
6	12	29	50*
8	6	58	14
10	1	26	39
11	19	55	7
13	14	23	42*
15	8	52	20
17	3	21	00
18	21	49	40
20	16	18	22*
22	10	47	8
24	5	15	54
25	23	44	44
27	18	13	32
		MARCH.	
1	12	42	21*
3	7	11	15
5	1	40	11
6	20	9	7
8	14	38	2*
10	9	6	58
12	3	35	54
13	22	4	50
15	16	33	45*
17	11	2	41*
19	5	31	36
21	00	00	32
22	18	29	28
24	12	58	26*
26	7	27	25
28	1	56	24
29	20	25	20
31	14	54	15*
		APRIL.	
2	9	23	10*
4	3	52	7
5	22	21	4
7	16	49	59*
9	11	18	53*
11	5	47	45
13	00	16	36
		Emersions.	
14	20	53	44
16	15	22	33*
18	9	51	22*
20	4	20	8
21	22	48	53
23	17	17	34
25	11	46	3*
27	6	14	53
29	00	43	32
30	19	12	11
		MAY.	

Eclipses *of the first Satellite of* Jupiter.

Emerſions.				Emerſions.				Emerſions.			
D.	H.	M.	S.	D.	H.	M.	S.	D.	H.	M.	S.
				19	8	26	55	6	3	21	16
	May.			21	2	55	19	7	21	50	18
				22	21	23	42	9	16	19	21
2	13	40	50*	24	15	52	7*	11	10	48	26
4	8	9	28*	26	10	20	34*	13	5	17	34
6	2	38	3	28	4	49	2	14	23	46	44
7	21	6	34	29	23	17	30	16	18	16	00
9	15	35	02*					18	12	45	18
11	10	3	32*		July.			20	7	14	40*
13	4	32	2					22	1	44	00
14	23	0	32	1	17	45	58	23	20	13	16
16	17	29	00	3	12	14	28*	25	14	42	33
18	11	57	25*	5	6	42	56	27	9	11	46
20	6	25	49	7	1	11	27	29	3	40	56
22	0	54	12	8	19	40	1	30	22	10	3
23	19	22	33	10	14	8	35*				
25	13	50	52*	12	8	37	11		September.		
27	8	19	8*	14	3	5	51				
29	2	47	26	15	21	34	34	1	16	39	14
30	21	15	45*	17	16	3	20*	3	11	8	31
				19	10	32	8*	5	5	37	50
	June.			21	5	00	59	7	00	7	6
				22	23	29	51	8	18	36	24
1	15	44	2	24	17	58	43	10	13	5	41
3	10	12	17*	26	12	27	37*	12	7	35	00
5	4	40	34	28	6	56	29	14	2	4	17
6	23	8	50	30	1	25	22	15	20	33	33
8	17	37	7	31	19	54	14	17	15	2	47
10	12	5	23*					19	9	31	56
12	6	33	40		August.			21	4	1	1
14	1	1	58					22	22	30	4
15	19	30	17	2	14	23	11	24	16	59	7
17	13	58	35*	4	8	52	13*	26	11	28	9

ECLIPSES *of the first Satellite of* JUPITER.

Emerſions.			
D.	H.	M.	S.
28	5	57	11*
30	00	26	13
OCTOBER.			
1	18	55	13
3	13	24	12
5	7	53	10
7	2	22	6
8	20	51	00
10	15	19	52
Jupiter and the Sun in Conjunction.			

Immerſions.			
D.	H.	M.	S.
NOVEMBER.			
Immerſions.			
Jupiter and the Sun in Conjunction.			
23	18	58	20*
25	13	26	2
27	7	53	43
29	2	21	22
30	20	49	1
DECEMBER.			
2	15	16	37
4	9	44	12

Immerſions.			
D.	H.	M.	S.
6	4	11	43
7	22	39	13
9	17	6	42*
11	11	34	10
13	6	1	37
15	00	29	2
16	18	56	27*
18	13	23	52
20	7	51	18
22	2	18	51
23	20	46	29
25	15	14	5
27	9	41	41
29	4	9	17
30	22	36	55

ECLIPSES *of the ſecond Satellite of* JUPITER.

Immerſions.			
JANUARY.			
4	4	5	27
7	17	21	24*
11	6	37	34
14	19	53	52
18	9	10	18
21	22	26	57
25	11	43	48
29	1	00	52
FEBRUARY.			
1	14	18	7*
5	3	35	32

Immerſions.			
8	16	53	00*
12	6	10	32
15	19	28	22
19	8	46	23
22	22	4	26
26	11	22	41*
MARCH.			
2	00	40	54
5	13	59	18*
9	3	17	44
12	16	36	7*
16	5	54	33
19	19	12	55

Immerſions.			
23	8	31	21
26	21	49	51
30	11	8	14*
APRIL.			
3	00	26	36
6	13	45	3*
10	3	3	29
13	16	21	40*
Emerſions.			
17	8	18	12*
20	21	36	17
24	10	54	12*
28	00	12	00

ECLIPSES *of the second Satellite of* JUPITER.

Emerſions.			
D.	H.	M.	S.
		MAY.	
1	13	29	45*
5	2	47	36
8	16	5	10
12	5	22	40
15	18	40	11
19	7	57	34
22	21	14	51
26	10	31	58*
29	23	49	7
		JUNE.	
2	13	6	20*
6	2	23	16
9	15	40	20
13	4	57	26
16	18	14	34
20	7	31	48
23	20	49	8
27	10	6	33*
30	22	24	1
		JULY.	
4	12	41	31*
8	1	59	5
11	15	16	47
15	4	34	37
18	17	52	41

Emerſions.			
M.	D.	H.	S.
22	7	10	55
25	20	29	13
29	9	47	31*
		AUGUST.	
1	23	5	50
5	12	24	28
9	1	43	4
12	15	1	47
16	4	20	43
19	17	39	54
23	6	59	5*
26	20	18	7
30	9	36	59
		SEPTEMBER.	
2	22	55	58
6	12	15	10
10	1	34	19
13	14	53	27
17	4	12	32
20	17	31	23
24	6	50	3
27	20	8	41
		OCTOBER.	
1	9	27	16
4	22	45	46

Emerſions.			
D.	M.	H.	S.
8	12	4	10
12	1	22	26

Jupiter and the Sun in Conjunction.

NOVEMBER.

Immerſions.

23	14	9	1
27	3	24	52
30	16	40	35

DECEMBER.

4	5	56	29
7	19	12	14*
11	8	27	42
14	21	43	11
18	10	58	42
22	00	14	23
25	13	30	5
29	2	45	56

JANU-

Eclipses *of the third Satellite of* Jupiter.

D.	H.	M.	S.
		JANUARY.	
		Immerſions.	
6	13	17	41
13	17	13	16*
20	21	9	29
28	1	6	31
		Emerſions.	
6	15	39	13*
13	19	34	18*
20	23	30	1
28	3	26	33
		FEBRUARY.	
		Immerſions.	
4	5	4	23
11	9	2	32
18	13	00	34*
25	17	1	7*
		Emerſions.	
4	7	23	55
11	11	21	34
18	15	20	6*
25	19	19	9
		MARCH.	
		Immerſions.	
4	21	1	1
12	1	1	7
19	5	1	11
26	9	1	22
		Emerſions.	
4	23	18	35
12	3	18	13
		APRIL.	
		Immerſions.	
2	13	1	24*
9	17	1	23
		Jupiter and the Sun in Conjunction.	
		Emerſions.	
		Jupiter and the Sun in Conjunction.	
16	23	16	22
24	3	15	24
		MAY.	
		Immerſions.	
22	16	53	42
29	20	51	17
		Emerſions.	
1	7	13	28
8	11	11	55*
15	15	10	1
22	19	7	48
29	23	5	9
		JUNE.	
		Immerſions.	
6	00	48	45
13	4	46	14
20	8	43	57*
27	12	42	1*
		Emerſions.	
6	3	2	1
13	6	59	34
20	10	57	1*
27	14	54	51
		JULY.	
		Immerſions.	
4	16	40	16
11	20	38	46
19	00	37	59
26	4	37	44
		Emerſions.	
4	18	52	58
12	22	51	22
19	2	50	29
26	6	50	10
		AUGUST.	
		Immerſions.	
2	8	37	36*
9	12	38	1
16	16	38	56
23	20	40	27
31	00	41	30

Eclipses *of the third Satellite of* Jupiter.

D.	H.	M.	S.
	August.		
	Emerſions.		
2	10	50	00
9	14	50	23
16	18	51	16
23	22	52	45
31	2	53	46
	September.		
	Immerſions.		
7	4	42	52
14	8	44	18
21	12	45	16
	Emerſions.		
7	6	55	12*
14	10	56	44
21	14	57	46
28	18	58	16
	October.		
	Jupiter and the Sun in Conjunction.		
	Emerſions.		
5	22	58	33
13	2	58	21
	November.		
	Immerſions.		
17	20	32	50
25	00	27	56
	Jupiter and the Sun in Conjunction.		
	December.		
	Immerſions.		
2	4	22	45
9	8	17	11
16	12	11	11
23	16	5	27
30	20	00	18*
	Emerſions.		
23	18	20	49*
30	22	15	00

The fourth Satellite continues to paſs wide of the Shadow, ſo that he will not be eclipſed this Year.

N. B. *Thoſe that are marked with a Star, are viſible at* London.

V. *Experiments to prove the Exiſtence of a* Fluid *in the* Nerves. *By* Alexander Stuart, *M. D. Med. Regin. R. S. S.* &c.

THE Exiſtence of a *Fluid* in the *Nerves* (commonly called the *Animal Spirits*) has been doubted of by many; and notwithſtanding Experiments made by Ligatures upon the *Nerves*, *&c.* continues to be controverted by ſome. This induced me to make the following Experiments, which, I hope, may help to ſet that Doctrine, which is of ſo much Conſequence in the Animal Oeconomy, and Practice of Phyſick, in a clearer Light than I think it has hitherto appeared in.

EXPERIMENT I.

I ſuſpended a Frog by the Fore Legs in a Frame, leaving the inferiour Parts looſe; then the Head being cut off with a Pair of Sciſſars, I made a ſlight Puſh perpendicularly downwards, upon the uppermoſt Extremity of the *Medulla Spinalis*, in the upper *Vertebra*, with the Button-end of the Probe, filed flat and ſmooth for that Purpoſe; by which all the inferiour Parts were inſtantaneouſly brought into the fulleſt and ſtrongeſt Contraction; and this I repeated ſeveral times, on the ſame Frog, with equal Succeſs; intermitting a few Seconds of Time between the Puſhes, which, if repeated too quick, made the Contractions much ſlighter.

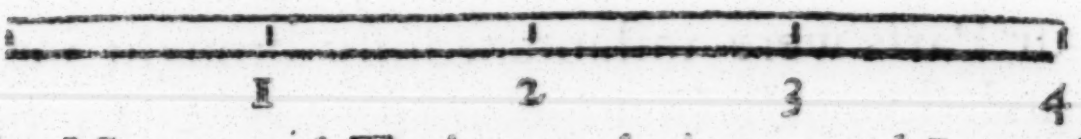
E X-

EXPERIMENT II.

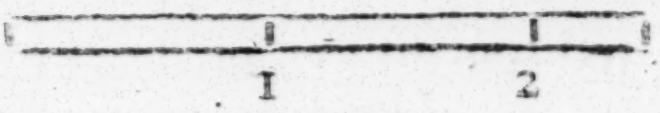
With the ſame flat Button-end of the Probe, I puſhed ſlightly towards the Brain in the Head, upon that End of the *Medulla Oblongata* appearing in the occipital Hole of the Skull; upon which the Eyes were convulſed. This alſo I repeated ſeveral times, on the ſame Head, with the ſame Effect.

EXPERIMENT III.

I tied a Piece of fine Twine, or Thread, parallel to the crural Artery, Vein and Nerve of a Dog; and made a Ligature on them, and on the Parallel Twine, above and below, at the Diſtance of about four Inches; then I cut beyond the Ligatures above and below, ſo as to take out the Veſſels and Nerve, together with the parallel Twine, in one Bundle; and laying them on a Board, both the Artery and Vein contracted immediately, and were ſhortned to almoſt one half of the natural Length which they had in the Body; to wit, to two Inches and a half; whereas the Nerve remained uncontracted, at its natural Length, and commenſurated to the parallel Twine of four Inches, as before it was cut out of the Body, according to the annexed Figure.



The Nerve and Twine at their natural Length.



Inches.

The Artery and Vein contracted.

By

By which it appears that the Proportion of the Blood-Veſſels in their compleateſt Contraction, to themſelves in a State of Extenſion, and to the Nerves at their conſtant and natural Length, is nearly as 5 to 8 ; or, which is the ſame thing, any given Section of a Blood-Veſſel, cut out and left to itſelf, is capable of contracting, ſo as to loſe $\frac{1}{8}$ Parts of its Length.

But though this Experiment may ſuffice for eſtimating the Elaſticity of the Blood-Veſſels in general, yet it is not to be doubted, but the Degree of their Strength and Elaſticity may differ a little more or leſs in Animals of different Species, and Individuals of the ſame Species, nay even in the ſame Individual at different Stages of Life ; but theſe Differences are not material to my preſent Purpoſe, which is only to ſhew, that the Nerves are not elaſtick, and that the Blood-Veſſels are ſo to a very conſiderable Degree.

INFERENCES from theſe EXPERIMENTS.

The two firſt Experiments ſhew, that the Brain and Nerves contribute to muſcular Motion, and that to a very high Degree.

The third Experiment makes it as plain, that what they contribute in muſcular Motion, cannot ariſe from, or be owing to Elaſticity, which they have not.

What remains therefore but to conclude, that the Action of the Nerves in muſcular Motion, is owing to the Fluid they contain, by whatever Name we may chooſe to call it.

To fortify this Concluſion, let us conſider, that we can have no other Evidence of the Exiſtence of that inviſible

inviſible Fluid the Air, and of its ſeveral Qualities of Elaſticity and Gravity, but what ariſes from Experiments and Obſervations of its Effects; which are ſufficiently ſatisfactory, and convince us of its Exiſtence, though the minute Particles of its Compoſition fall under none of our Senſes.

Therefore, in the ſame manner, ſeeing theſe Experiments put the Elaſticity and elaſtick Vibrations of the Nerves quite out of the Queſtion, I think we may as fairly conclude, that there is a Fluid in the Nerves, though inviſible; as that there is ſuch a Fluid called the Air, though it cannot be ſeen.

I ſhall only add, that though we may call this nervous Fluid by any Name, to which a proper, determined and fixed Idea is annexed, yet I think the Word (*Spirits*) was an unhappy Choice, as it includes an Idea either of ſomething like to the Spirits of fermented Liquors, or ſome of the ſaline volatile Spirits, as that of *Hart's-horn*, &c. or a flying Vapour or Exhalation, all which being looſe and indetermined, have ſerv'd only to miſlead the Inquiſitive, and amuſe the Ignorant.

But the Source from which this Fluid ariſeth, to wit, the circulating Blood; the Veſſels through which it is ſecerned; and the Nerves in which it moves and is contained; the ſoft and almoſt inſipid Taſte, and no Smell obſervable in the Brain and Nerves, ſuggeſt no Idea of ſuch Spirits: And the ſimple Qualities of a pure and perfectly defecated elementary Water, will better ſuit all that our Senſes can diſcover of it, and are indeed ſufficient to ſolve all the Phœnomena of the Animal Œconomy, as far as they depend upon the Nerves: Which I hope to have an Opportunity of explain-

explaining, in ſome of the moſt remarkable Animal Motions, ſome time hereafter, at greater Length than this preſent Occaſion will admit of.

VI. *Obſervations of* Latitude *and* Variation, *taken on Board the* Hartford, *in her Paſſage from* Java Head *to* St. Hellena, Anno Dom. $173\frac{1}{2}$. *Communicated by* Edmund Halley, *LL. D. Regius Aſtronomer at* Greenwich.

ON *Wedneſday*, *February* the 2d, we took our Departure from *Java Head*, allowing it to lie in the Latitude of 6° 45′ South.

Monday, *February* 7.

By a good Amplitude made	3°	28′	Variat. NWly.
Latitude by Account	9	59	South.
Merid. Diſt. from *Java Head*	43	}	Weſt.
Longitude from ditto	45	}	

Sunday, *February* 13.

By a good Azimuth made	4°	45′	Variat. NWly.
Latitude by good Obſervat.	13	43	South.
Merid. Diſt. from *Java Head*	3	31	} Weſt.
Longitude from ditto	3	36	}

Tueſday, *February* 15.

By a good Amplitude	4°	52′	Variat. NWly.
Latitude *per* Obſervation	15	18	South.
Merid. Diſt. from *Java Head*	6	1	} Weſt.
Longitude from ditto	6	9	}

Monday, February 21.

By a good Azimuth and Amplitude	4°	51′	Variat. NW.
Latitude *per* Obſervation	18	12	South.
Merid. Diſt. from *Java Head*	17	28	West.
Longitude from ditto	18	00	West.

Friday, February 25.

By a good Amplitude	6°	08′	Variat. NW.
Latitude *per* Obſervation	19	59	South.
Merid. Diſt. from *Java Head*	21	17	West.
Longitude from ditto	22	1	West.

Tueſday, February 29.

By a good Azimuth	10°	3′	Variat. NW.
Latitude *per* Obſervation	21	00	South.
Merid. Diſt. from *Java Head*	30	28	West.
Longitude from ditto	32	12	West.

Sunday, March 5.

By a good Amplitude made	15°	15′	Variat. NW.
Latitude *per* Obſervation	23	16	South.
Merid. Diſt. from *Java Head*	37	18	West.
Longitude from ditto	38	58	West.

Wedneſday, March 8.

By a good Amplitude made	18°	02	Variat. NW.
Latitude *per* Obſervation	25	11	South.
Merid. Diſt. from *Java Head*	40	30	West.
Longitude from ditto	42	33	West.

Friday, March 10.

By an Azimuth & Amplitude made	19°	00′	Variat. NW.
Latitude *per* Obſervation	26	18	South.
Meridian Diſtance	42	42	West.
Longitude	44	15	West.

Monday,

Monday, March 13.

By a very good Amplitude	21°	45′	Variat. NW.
Latitude *per* Obſervation	27	23	South.
Meridian Diſtance	44	14	West.
Longitude from *Java*	46	34	

Friday, March 17.

By a good Azimuth made	24°	23′	Variat. NW.
Latitude by Account	30	25	South.
Merid. Diſt. from *Java Head*	51	29	West.
Longitude ditto	54	52	

Sunday, March 19.

By a good Azimuth had	24°	50′	Variat. NW.
Latitude *per* Obſervation	30	27	South.
Meridian Diſtance	56	40	West.
Longitude	59	21	

Wedneſday, March 22.

By a good Azimuth had	24°	15′	Variat. NW.
Latitude *per* Account	31	23	South.
Merid. Diſt. from *Java Head*	61	37	West.
Longitude from ditto	66	03	

Friday, March 24.

By a good Amplitude had	23°	51′	Variat. NW.
Latitude *per* Obſervation	32	47	South.
Meridian Diſtance	63	00	West.
Longitude	67	44	

Saturday, April 1.

By a good Amplitude made	20°	16′	Variat. NW.
Latitude by Obſervation	34	58	South.
Merid. Diſt. from *Java Head*	73	36	West.
Longitude from ditto	79	44	

Tueſday, April 4.

By a good Azimuth and Amplitude	20°	07′	Variat. NW.
Latitude *per* Obſervation	35	33	South.
Merid. Diſt. from *Java Head*	74	42	West.
Longitude from ditto	81	24	West.

Thurſday, April 6.

By a good Amplitude made	19°	07′	Variat. NW.
Latitude *per* Obſervation	35	41	South.
Merid. Diſt. from *Java Head*	77	02	West.
Longitude from ditto	87	12	West.

Friday, April 7.

By a very good Amplitude made	17°	30′	Variat. NW.
Latitude by Obſervation	36	25	South.
Meridian Diſtance from *Java*	77	56	West.
Longitude from ditto	87	38	West.

Monday, April 10.

By a good Azim. & Amplitude made	16°	09′	Variat. NW.
Latitude *per* Obſervation	38	18	South.
Merid. Diſt. from *Java Head*	77	24	West.
Longitude from ditto	87	26	West.

Thurſday, April 13.

By a good Azim. & Amplitude made	15°	40′	Variat. NW.
Latitude *per* Obſervation	37	58	South.
Merid. Diſt. from *Java Head*	77	21	West.
Longitude from ditto	85	15	West.

Friday, April 14.

By a very good Azim. & Amplitudes	15°	45′	Variat. NW.
Latitude *per* Obſervation	37	04	South.
Merid. Diſt. from *Java Head*	76	54	West.
Longitude from ditto	84	42	West.

N. B. This Day I judged Cape *Bonne Eſperance* to bear N by W. from me, Diſtance 2° 34′.

Sunday,

Sunday, April 16.

By a very good Azimuth made	16°	14′	Variat. NW.
Latitude *per* Obſervation	36	15	South.
Merid. Diſt. from *Java Head*	77	59	}
Ditto from Cape *Bonne Eſperance*	00	30	} Weſt.
Longitude from *Java Head*	85	14	}

Tueſday, April 18.

By a very good Amplitude made	15°	45′	Variat. NW.
Latitude *per* Obſervation	35	33	South.
Merid. Diſt. from *Java Head*	79	05	}
Ditto from Cape *Bonne Eſperance*	01	36	} Weſt.
Longitude from *Java Head*	86	10	}

Friday, April 21.

By a very good Azimuth made	14°	40′	Variation.
Latitude *per* Obſervation	32	23	South.
Merid. Diſt. from *Java Head*	81	09	}
Ditto from Cape *Bonne Eſperance*	03	40	} Weſt.
Longitude from *Java Head*	87	09	}

Monday, April 24.

By a good Amplitude made	12°	39′	Variat. NW.
Latitude by Obſervation	27	01	South.
Merid. Diſt. from *Java Head*	84	52	}
Ditto from Cape *Bonne Eſperance*	07	23	} Weſt.
Longitude from *Java Head*	89	18	}

Saturday, April 29.

By good Azimuths made	11°	20′	Variation.
Latitude *per* Obſervation	21	45	South.
Meridian Diſt. from *Java Head*	89	08	}
Ditto from Cape *Bonne Eſperance*	11	41	} Weſt.
Longitude from *Java Head*	92	20	}

Friday,

Friday, May 5.

Latitude *per* Obſervation 16° 00′ South.
Meridian Diſt. from *Java Head* 97 43 } Weſt.
Ditto from Cape *Bonne Eſperance* 20 16 } Weſt.
Longitude from *Java Head* 99 53 }
By an Ampl. the Night before came in 8 00 NW.

At Noon *Barn Point* bore W by N ½ N. Diſtance four Miles.

VII. *An Account of an extraordinary* Eruption *of Mount* Veſuvius *in the Month of* March, *in the Year* 1730, *extracted from the* Meteorological Diary *of that Year at* Naples, *communicated by* Nichol. Cyrillus, *M. D. R. S. S.*

THE Thermometer uſed in this *Diary*, was made by Mr. *Hauksbee*, in which the Freezing-Point is marked at 65 Degrees under the Point extreme Hot; but the Doctor obſerves, that at *Naples* Water will freeze when this Thermometer ſtands at 55 Degrees only: Which, he is of Opinion, ſeems to argue, that there is ſomething elſe beſides an intenſe Degree of Cold required for freezing Water; that the Air of *Naples* abounds in it, more than the Air of *London*; and that this may probably be of a ſaline Nature; becauſe when we turn Water into Ice by the Help of Snow, it is neceſſary to mix Salt with it.

March	Ther.	Winds.	
8. 1730.	40 : 0.	S. 3	Cloudy Weather; ſtrong South Wind. *Veſuvius* ſent forth a great Smoak and Stream of Fire, with hollow Rumbling.

March	Ther.	Winds.		
9.	38: 0.	W. 1	The Weather cloudy. The following Night *Veſuvius* thundred as it were twice. In the Day the Windows trembled a little.
10, 11, 12.	39: 0.	S. 1	Cloudy ; Rain now and then : The Clouds hide the Smoak and Fire.
13.	41: 1.	NW. 1	Weather rather clear. The Smoak is leſſened.
14.	47: 0.	N. 2	A little Rain in the Night, in the Morning Snow in the Mountains. In the Forenoon the Snow increaſed again. In the Evening after Eight o'Clock the Fire aroſe to a vaſt Height, and threw huge Stones to almoſt half the perpendicular Height of the Mountain. Pumice Stones red hot of two or more Ounces Weight, were driven ſeveral Miles like a Shower of Hail, and frightned away the Birds. In about an Hour's time the Height of the Flame was ſomewhat leſſened ; and through the middle of the thick Smoak Flaſhes of Lightning were often ſeen.
March	Ther.	Winds.		
15.	50. 0	NE. 1	Clear Weather. Thick Smoak ſcatter'd the Aſhes many Miles over the Sea.
16.	48: 0.	S. 1	Clear in the Morning; about Noon cloudy, ſmall Rain and cold. By Change of the Winds the Smoak and Aſhes were carried towards the N. Clouds hide the Mountain.
17.	40: 1.	S. 1	A few thin Clouds. The Smoak turn'd with the Wind.

March

March	Ther.	Winds.		
18.	40.	S. SW.	1	Clear. The City was ſprinkled over with ſmall Aſhes, like Kitchen Aſhes, which were attracted by the Loadſtone.
19.	42.	0	W. 1	A Few thin Clouds.
20.	37.	0	0	Almoſt clear. *Veſuvius* became entirely quiet.

VIII. *A ſhort Account, by* Mr. John Eames, *F. R. S. of a Book intituled,* Tuhhfat ilkibar, *printed at* Conſtantinople, Anno Dom. 1728.

THE Advantage of Printing above Writing, has at laſt prevailed with the Grand Signor to permit a Printing-Preſs to be ſet up at *Conſtantinople*. It was obtained upon a Memorial preſented to him by the Grand Vizier, with the Conſent of the Mufti.

The Privilege is granted to *Zaid* the Son of *Mehemet Effendi*, late Ambaſſador in *France*, and *Ibrahim Mutafarrica*, the Author of a ſmall Tract in this Book. The Licence extends to the printing all Sorts of Books written in the Oriental Languages, except ſuch as treat of the *Mahometan* Religion.

The Book before me ſeems to be one of the firſt that ever was printed there. For though *Giauhauri*'s *Arabic* Dictionary, tranſlated into *Turkiſh*, was what the *Turks* deſigned, for particular Reaſons, to begin withal; yet the Manuſcript, from which they printed off the firſt Sheets, was found to be ſo incorrect, that the Grand Signor ordered the printing of it to be ſtopt, 'till a more correct Copy could be procured.

During this Stop, the Book I am to give a brief Account of was printed, containing about 150 Leaves .

The Language of it is not *Arabic*, as was ſuppoſed, but *Turkiſh*, though it has ſeveral Words and ſome Sentences that are ſo. The Title, or what may ſerve as ſuch, is *Tuhhfat ilkibar*, or, *A Preſent to the Great*; containing an Account of ſeveral Engagements at Sea. The Author is *Hagi Califa*, ſtiled *Chelebi Almurhhum*, *i.e.* A Gentleman who has obtained Mercy, or deceaſed.

It conſiſts of two Tracts, a large, and a very ſmall one. The latter is done by the Publiſher, *Ibrahim Mutaſarrica*, *Mutaſarrica* is a Title of Honour ſignifying a Horſe-Soldier, obliged to go to the Wars when the Grand Signor goes in Perſon, but not elſe.

It is a ſhort Account of Geographical Meaſures of Diſtances, *&c.* particularly of the Circumference of the Earth.

The principal Treatiſe is partly Hiſtorical, and partly Geographical; the latter treats of the Nature of the Terreſtrial Globe, the Uſe of Maps, and Situation of Places, particularly of *Venice*, *Corfu*, *Albania*, *&c.* and ſuch as border upon the *Turkiſh* Dominions.

The Hiſtorical Part is an Account of ſeveral Naval Expeditions and Battles between the *Turks* and *Chriſtians*, eſpecially during the Holy War, in the *Mediterranean* Sea, with their Conqueſt of the Iſlands and Places of Note upon the Sea-Coaſts. It is an Abridgement of the Hiſtory of their Admirals, from the taking of *Conſtantinople* to the Year 1653; gives a Deſcription of the Grand Signor's Arſenal at the *Porte*, with the Charges of maintaining it; and concludes with ſome Directions to the *Turkiſh* Officers.

Beſides a general Map of the World, there are three others; one of the *Mediterranean*, or *White Sea*, as

the *Turks* call it ; another of the *Archipelago*, and the third of the *Venetian* Gulph : They have each Scales of *Turkiſh*, *French* and *Italian* Miles annexed ; but what is ſomething ſurprizing theſe Maps have the Degrees of Latitude, but not of Longitude, marked upon the Sides.

The laſt Plate has two Mariner's Compaſſes, the one containing the *Turkiſh* Names of the ſeveral Points ; the other, beſides the *Turkiſh*, has the *Arabic* Names, which are taken from certain Stars ſuppoſed to riſe and ſet upon or near thoſe Points.

The Book ends with Words to this Senſe : This Treatiſe was done by the Perſons employ'd in the Buſineſs of Printing, at the Printing-Houſe erected in the noble Month of *Dulkaadah*, in the Year 1141, (*i. e.* 1728) in the good City of *Conſtantinople*. May God, *&c.*

I forgot to obſerve, it has the Imprimatur, or Commendations of a *Turkiſh* Divine, and three *Effendies*, prefix'd ; and at the End an Index of the *Errata*, with their Emendations in three Pages. The whole is done upon ſhining or gumm'd Paper, ſtamp'd with three Creſcents in Pale, and an Imperial Crown, proper to the *Turks*.

I join with the learned Mr. *Clodius* (Author of a *Turkiſh* Lexicon and Grammar lately publiſhed at *Lipſic*) in wiſhing the *Turks* would print a compleat *Livy*, which Fame ſays is repoſited in the Grand Signor's Library in the *Turkiſh* Language, together with other *European* Books tranſlated into *Turkiſh*, whoſe Originals are not to be met with in *Europe*, a Catalogue of ſome of which is expected from the younger Monſ. *Fourmond*.

F I N I S.

Numb. 425.

PHILOSOPHICAL TRANSACTIONS.

For the Months of *September* and *October*, 1732.

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II. EPHEMERIDES METEOROLOGICÆ, Barometricæ, Thermometricæ, Epidemicæ, Magneticæ, ULTRAJECTINÆ, *conſcripta à* Petro Van Muſchenbroek, *L. A. M. Med. & Phil. D. Phil. & Matheſ. Profeſſ. in Acad.* Ultraj. Anno 1729.

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VI. *A Letter from Mr.* John Dove *to* Edmund Halley, *LL. D. F. R. S. and Reg. Aſtrom. at* Greenwich, *containing an Account of a* Comet *ſeen on* February 29, 173$\frac{1}{2}$.

V. *An Account of two Experiments of the* Friction *of* Pullies. *By the Reverend* J. T. Deſaguliers, *LL. D. F. R. S.*

Jos: Banks

I. *An*

I. *An Account of Obſervations made on Board the* Chatham-Yacht, Auguſt 30*th and* 31*ſt, and* September 1*ſt*, 1732, *in purſuance of an Order made by the Right Honourable the Lords Commiſſioners of the Admiralty, for the Trial of an Inſtrument for taking* Angles, *deſcribed in* Philoſophical Tranſactions, *Numb*, 420. *By* John Hadley, *Eſq*; *Vice-Preſident of the* Royal Society.

IN *May*, 1731, I communicated to the *Society* the Deſcription of a new Inſtrument for taking Angles, and produced a Specimen of an Inſtrument made accordingly. Several of the Gentlemen to whom it was ſhewn, as well then as at other times, entertained a favourable Opinion of the Probability of its Uſefulneſs, particularly our worthy Vice-Preſident Dr. *Edmund Halley*, Aſtr. Reg. and the Reverend Mr. *James Bradley*, Aſtr. Pr. S. not only expreſſed their Deſire that Trial ſhould be made of it at Sea, but promiſed the Favour of their Company and Aſſiſtance on that Occaſion.

The Inſtrument produced at the *Society* was made of Wood, according to *Fig*. IV. *Tranſact*. N° 420. of the 'foremention'd Deſcription, and was intended chiefly for taking Altitudes of the Sun, Moon and Stars, from the viſible Horizon, either forwards or backwards; I therefore procured another to be made of Braſs by Mr. *J*.

Siſſon, for taking the Diſtance of any kind of Objects. It is ſupported by a ſingle Stem ſkrewed on to it on the under Side, the lower End of which may reſt on the Ground, to eaſe the Obſerver of the Weight of the Inſtrument. This Stem is alſo made to lengthen or ſhorten, by which Means the Inſtrument is brought to the proper Height for any Obſerver's Eye, either ſtanding or ſitting. Inſtead of a Ball and Socket, it has two circular Arches fixed on its Back, by which it is readily ſet to any Poſition which the Situation of the Objects may require.

The Right Honourable the Lords Commiſſioners of the Admiralty having been pleaſed to order the *Chatham-Yacht* for the Trial of the ſaid Inſtrument, and to give Directions to Mr. *James Young*, Maſter Attendant at *Chatham*, a Gentleman well ſkill'd in Navigation, to be preſent at the Trial, my two Brothers and Self went on Board accordingly *Wedneſday*, *Auguſt* the 30th, being favoured with the Company (beſides the two 'forementioned Gentlemen) of the Reverend Sir *Robert Pye*, Bart. and *Robert Ord*, Eſq; Members of this *Society*. We met Mr. *Young* at *Sheerneſs* the next Day, who accompanied us down about three Leagues below the *Nore*, near the *Spile-Sand*, and was on Board on *Friday*, *September* the 1ſt, when we lay by there, and the ſeveral Altitudes of the Sun were taken as it approached the Meridian from about Ten of the Clock 'till Noon.

The

The Obſervations were as follow.

Auguſt the 30th, near Midnight, Mr. *Bradley* obſerved the Diſtance of *Lucida Lyræ* from *Cor Aquilæ* by the Braſs Inſtrument off *Graveſend* in ſtill Water, 34° 13′ 30″

The ſame repeated was 34 13 15

The Error of the Inſtrument in that Place is 23″ to be ſubtracted.

The Diſtance of thoſe Stars, according to Mr. *Flamſteed*, is 34° 11′ 50″

Which by the Refraction is reduced to 34 11 10

Auguſt the 31ſt, about 10^h 30′, Mr. *Bradley* obſerved the Diſtance of *Capella* from the *North Pointer* in the *Great Bear's* Back, by the ſame Inſtrument, while we lay at Anchor in the Mouth of the *Medway* near *Sheerneſs*, the Wind blowing hard at North Eaſt, 49° 14′ 00″+

Or 49 15 00

Mr. *Bradley* and my ſelf making a ſmall Difference in numbring the Angle mark'd by the Index.

The Error of the Diviſion of the Inſtrument there is 30″ to be added.

The Diſtance of thoſe Stars, according to Mr. *Flamſteed*, is 49° 16′ 00″

By the Refraction reduced to 49 14 20

Clouds coming up prevented the repeating this Obſervation, nor had we any Opportunity of making any others of this kind.

Altitudes of the Sun observed by Mr. *Bradley*, lying at Anchor in the Mouth of the *Medway*, *Auguſt* the 31ſt, Afternoon, the Wind at North-Eaſt, a freſh Gale, by the Wooden-Inſtrument forwards.
The Watch being ſuppoſed 3′ 30″ depreſſed below the true peared to be about 8′ 45″ too ſlow; the viſible Horizon being ſuppoſed by the Mean of the Obſervations apby the Height of the Obſerver's Eye above the Surface of the Water, amounting to about 8 or 9 Feet.

Time by Watch.	True Time.	True Alt. of Sun's upper Limb from the viſible Horizon.	Refraction, add.	Appt Alt. of Sun's upper Limb from the viſible Horizon.	Alt. of the Sun's upper Limb obſerved.	Errors of Diviſion of the Inſtr. Subſtr.	Obſerved Alt. of the Sun's upper Limb corrected.	Errors of Obſervation.
h ′ ″	h. ′ ″	° ′ ″	′ ″	° ′ ″	° ′ ″	′ ″	° ′ ″	′ ″
5 11 50	5 20 35	9 50 31	4 54	9 55 25	9 57 00	2 15	9 54 45	−0 40
16 30	25 15	07 00	5 17	12 17	13 30	2 15	11 15	−1 02
18 20	27 05	8 49 52	5 27	8 55 19	8 57 30	3 00	8 54 30	−0 49
21 20	30 05	21 51	5 44	27 35	30 00	3 00	27 00	−0 35
28 5	36 50	7 18 44	6 28	7 25 12	7 27 30	2 00	7 25 30	+0 18
30 35	39 20	6 55 22	6 46	02 08	05 00	2 15	02 45	+0 37
32 25	41 10	38 13	7 03	6 45 16	6 48 00	2 15	6 45 45	+0 29
36 30	45 15	00 00	7 40	07 40	10 00	2 15	07 45	+0 05
38 37	47 22	5 40 11	8 03	5 48 14	5 51 00	2 15	5 48 45	+0 31
40 35	49 20	21 50	8 24	30 14	34 00	2 15	31 45	+1 31
42 34	51 19	03 14	8 50	12 04	15 00	3 00	12 00	−0 04
43 50	52 35	4 51 24	9 07	00 31	03 30	3 00	00 30	−0 1

Altitudes

Altitudes of the Sun, obſerved *September* the 1ſt, before Noon, under Sail from *Sheerneſs* towards the *Spile-Sand*, with the Tide of Ebb, the Wind blowing hard at North-Eaſt, by the Wooden Inſtrument forward. The ſecond Speculum being removed by ſome Accident from its due Poſition, ſo as to increaſe the Angles obſerv'd about one Degree three Minutes and a half, as appeared by the firſt Obſervations of the Afternoon of the ſame Day, made with the ſame Inſtrument, in the ſame manner, while we continued lying-by near the *Spile*; and that Degree and three Minutes and a half are added to the Errors of the Diviſions of the Inſtrument in the ſeventh Column. While theſe Obſervations were making, the Yacht ſteered at firſt chiefly Eaſt, ſometimes South-Eaſt, afterwards ſtood to the North-Eaſt, towards the *Swin*. The Time of the Watch was regulated by ſome of the later Obſervations made when we were moſt Eaſtward, and this was probably the Cauſe why the firſt Altitudes, which were taken while we were more Weſterly, fall ſo much ſhort of the Computations, the Difference decreaſing gradually as we advanced towards the Eaſt.

Altitudes

Altitudes obſerved by Mr. *Bradley*.

Time by Watch.	True Time.	True Alt. of the Sun's lower Limb from the viſible Horizon.	Refraction, add.	Appt Alt. of the Sun's lower Limb from the viſible Horizon.	Altitude of the Sun's lower Limb obſerved.	Errors of the Inſtrument ſubſtract.	Obſerved Altitude of the Sun's lower Limb corrected.	Errors of Obſervation.
h. ′ ″	h. ′ ″	° ′ ″	′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	′ ″
7 09 15	7 18 15	15 05 39	3 15	15 08 54	16 09 00	1 5 45	15 03 15	—5 39
11 44	20 44	28 13	3 11	31 24	33 00—	1 5 45	27 15—	—4 09+
13 38	22 38	45 23	3 08	48 31	49 00	1 5 45	43 15	—5 16
14 53	23 53	56 43	3 05	59 48	17 02 00	1 5 45	56 15	—3 33
16 33	25 33	16 11 47	3 02	16 14 49	18 00—	1 5 45	16 12 15—	—2 34+
18 04	27 04	25 31	2 59	28 30	32 00	1 5 45	26 15	—2 15
23 54	32 54	17 18 00	2 50	17 20 50	18 25 00	1 6 30	17 19 30	—1 20
25 38	34 38	33 31	2 47	36 18	43 00+	1 6 00	37 00+	+0 42+
28 25	37 25	58 23	2 43	18 01 06	19 07 00—	1 6 00	18 01 00—	—0 06+
30 44	39 44	18 19 04	2 40	21 44	28 00	1 5 00	23 00	+1 16
34 21	43 21	51 10	2 35	53 45	20 00 00	1 4 30	55 30	+1 45
36 24	45 24	19 09 18	2 33	19 11 51	16 00	1 4 30	19 11 30	—0 21
38 44	47 44	29 54	2 30	32 24	38 00—	1 4 30	33 30—	+1 06—uncertain
40 30	49 30	45 27	2 28	47 55	52 00+	1 4 30	47 30+	—0 25—
42 00	51 00	58 41	2 26	20 01 07	21 04 00+	1 4 30	59 30+	—1 37—
45 34	54 34	20 29 51	2 22	32 13	35 00	1 4 30	20 30 30	—1 43

The ſame continued by Mr. *John Hadley*.

Time by Watch.			True Time.			True Alt. of the Sun's lower Limb from the viſible Horizon.			Refraction, add.		App^{t} Alt. of the Sun's lower Limb from the viſible Horizon.			Altitude of the Sun's lower Limb obſerved.			Errors of the Inſtrument ſubſtract.			Obſerved Altitude of the Sun's lower Limb corrected.			Errors of Obſervation.		
h.	′	″	h.	′	″	°	′	″	″		°	′	″	°	′	″	°	′	″	°	′	″		′	″
7	52	18	8	01	18	21	28	21	2	15	21	30	36	22	36	00—	1	4	30	21	31	30—	+	0	54—	
	54	18		03	18		45	43	2	13		47	56		52	00	1	4	30		47	30	−	0	26	
	55	40		04	40		57	25	2	12		59	37	23	04	00	1	4	30		59	30	—	0	07	
	58	22		07	22	22	20	34	2	09	22	22	43		30	00	1	5	15	22	24	45	+	2	02	uncertain.
8	02	51		11	51		58	46	2	06	23	00	52	24	04	00	1	5	15		58	45	—	2	07	
	09	19		18	19	23	53	26	2	00		55	26	25	00	00+	1	5	30	23	54	30+	—	0	56—	
	13	10		22	10	24	25	35	1	57	24	27	32		32	00	1	5	30	24	26	30	—	1	02	
	14	45		23	45		38	43	1	56		40	39		45	00+	1	5	30		39	30+	—	1	09—	
	16	55		25	55		56	24	1	55		58	19	26	03	00	1	5	30		57	30	—	0	49	
	19	05		28	05	25	14	34	1	53	25	16	27		22	00+	1	5	30	25	16	30+	+	0	03+	
	22	57		31	57		46	14	1	51		48	05		52	00—	1	5	30		46	30—	—	1	35+	
	25	05		34	05	26	03	35	1	49	26	05	24	27	10	00—	1	5	30	26	04	30—	—	0	54+	
	26	43		35	43		16	50	1	48		18	08		22	00+	1	5	30		16	30+	—	1	38—	
	28	20		37	20		29	54	1	47		31	41		35	00	1	5	30		29	30	—	2	11	

Altitudes

The flame continued by Mr. *Bradley*.

Altitudes of the Sun, obſerved lying-by near the *Spile*, *September* the 1ſt, before Noon, with the Wooden Inſtrument backward, the Wind continuing to blow hard, as before, at North-Eaſt. The Inſtrument when uſed for the back Obſervation was ſo adjuſted, as to allow for a Dip of the viſible Horizon of two Minutes and a half; conſequently that Dip being ſuppoſed, as before, three Minutes and a half, there remains only one Minute to be accounted for, in computing the Height of the Sun, which is accordingly ſubtracted in the third Column from the Altitudes found by Computation. The Watch now appeared to be 9′ 30″ too ſlow.

Altitudes obſerved by Mr. *John Hadley*.

Time by Watch.	True Time.	True Alt. of the Sun's upper Limb.	Refraction, add.	Appt Alt. of the Sun's upper Limb.	Alt. of the Sun's upper Limb obſerved.	Errors in the Diviſion. subſtr.	Obſerved Altitude of the Sun's upper Limb corrected.	Errors of Obſervation.
h. ′ ″	h. ′ ″	° ′ ″	′ ″	° ′ ″	° ′ ″	′ ″	° ′ ″	′ ″
9 52 55	10 02 25	36 52 54	1 11	36 54 05	36 46 00	1 00	36 45 00	−9 05
10 02 07	11 37	37 43 37	1 09	37 44 46	37 44 00	1 00	37 43 00	−1 46
06 00	15 30	38 04 00	1 08	38 05 08	38 04 00	1 00	38 03 00	−2 08
08 53	18 23	19 00	1 08	20 08	22 00 +	1 00	21 00 +	+ 0 52 +
12 25	21 55	36 25	1 07	37 32	41 00	1 30	39 30	+ 1 58
16 30	26 00	56 09	1 06	57 15	39 00 00	1 30	58 30	+ 1 15
18 50	28 20	39 07 07	1 06	39 08 13	06 00	0 30	39 05 30	−2 43
20 40	30 10	15 26	1 06	16 32	14 00	0 30	13 30	−3 02

The ſame continued by Mr. *Bradley*.

Time by Watch.			True Time.			True Alt. of the Sun's upper Limb.			Re-fracti-on, add.		App^{t} Alt. of the Sun's upper Limb.			Alt. of the Sun's upper Limb ob-ſerved.			Errors in the Diviſi-on. Subſtr.		Obſerved Altitude of the Sun's upper Limb corrected.			Errors of Obſervati-on.		
h.	′	″	h.	′	″	°	′	″	′	″	°	′	″	°	′	″	′	″	°	′	″			
10	30	18	10	39	48	39	57	28	1	04	39	58	32	40	00	00	2	00	39	58	00	−0	32	
	33	23		42	53	40	10	02	1	04	40	11	06		12	00	2	00	40	10	00	−1	06	
	35	53		45	23		19	51	1	04		20	55		16	00−	2	00		14	00−	−6	55	+
	37	48		47	18		27	13	1	03		28	16		32	00−	2	30		29	30−	+1	14	−
	39	22		48	52		33	02	1	03		34	06		36	00	2	30		33	30	−0	36	
Continued yb Mr. *Henry Hadley*.																								
11	08	05	11	17	35	41	59	36	1	00	42	00	36	42	15	00+	2	30	42	12	30+	+11	54	+
	16	20		25	50	42	16	36	1	00		17	36		20	00	2	30		17	30	−00	06	
	22	00		31	30		25	48	0	59		26	47		31	00	2	45		28	15	+01	28	
	24	20		33	50		29	35	0	59		30	34		34	00	2	45		31	15	+00	41	
	28	00		37	30		34	27	0	59		35	26		39	00	2	45		36	15	+00	49	
	33	45		43	15		40	32	0	58		41	30		45	00−	3	00		42	00−	+00	30	−
	37	45		47	15		43	43	0	58		44	41		48	00+	3	00		45	00+	+00	19	+
	40	30		50	00		45	25	0	58		46	23		49	00	3	00		46	00	−00	23	
	43	00		52	30		46	34	0	58		47	32		51	00	3	00		48	00	+00	28	
	47	00		56	30		47	42	0	58		48	40		52	00	3	00		49	00	+00	20	
	again.														52	00	3	00		49	00	+		
	again.		12	00	00		48	02	0	58		49	00		52	00	3	00		49	00		00	09	

Between each of the five laſt of theſe Obſervations the Index was removed ſo as to make them entirely independent of one another; and from their near Agreement among themſelves, and with good Part of the preceding, I conclude the true

Height of the Sun's Center above the real Horizon at Noon was exactly enough 42° 33′ his Semidiameter being 16 Min. from which, and the Sun's Declination 4° 1′ the Latitude of the Place will be 51° 28′, which is accordingly uſed in all the Computations.

Altitudes of the Sun obſerved *September* 1, 1732, Afternoon, near the *Buoy of the Spile*, and under Sail Weſtward, by the Wooden Inſtrument forwards, the ſecond Speculum remaining diſplaced as in the Morning.

Altitudes obſerved by Mr. *Bradley*.

Time by Watch.	True Time.	True Alt. of the Sun's lower Limb from the viſible Horizon.	Refraction, add.	App^{t} Alt. of the Sun's lower Limb from the viſible Horizon.	Altitude of the Sun's lower Limb obſerved.	Errors of the Inſtrument ſubſtract.	Obſerved Altitude of the Sun's lower Limb corrected.	Errors of Obſervation.	
h. ′ ″	h. ′ ″	° ′ ″	′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	′ ″	
12 07 30	12 17 00	42 12 13	1 00	42 13 13	43 20 00	1 6 0	42 14 00	+0 47	
08 30	18 00	11 09	1 00	12 09	19 00	1 6 0	13 00	+0 51	
12 00	21 30	07 18	1 00	08 18	13 00	1 6 0	07 00	−1 18	
19 50	29 20	41 56 00	1 00	41 57 00	01 00	1 6 0	41 55 00	−2 00	

The ſame continued by Mr. *Henry Hadley*.

1	00	00	1	09	30	40	09	21	1 03	40	10	24	41	13	00	1 6 0	40	07	00	−3	24	uncertain
	01	35		11	05		03	20	1 04		04	24		10	00	1 6 0		04	00	−0	24	
	03	02		12	32	39	57	59	1 04	39	59	03		04	00	1 6 0	39	58	00	−1	03	
	04	21		13	51		52	57	1 04		54	01		02	00	1 6 0		56	00	+1	59	
	06	14		15	44		45	31	1 04		46	35	40	52	00	1 6 0		46	00	−0	35	
	07	30		17	00		40	28	1 04		41	32		49	00	1 6 0		43	00	+1	28	
	08	43		18	13		35	37	1 05		36	42		40	00	1 6 0		34	00	−2	42	uncertain
	10	00		19	30		30	28	1 05		31	33		38	00	1 6 0		32	00	+0	27	
	11	29		20	59		24	22	1 06		25	28		34	00	1 6 0		28	00	+2	32	
	14	23		23	53		11	46	1 06		12	52		18	00	1 6 0		12	00	−0	52	

The firſt and ſixth Columns of the preceding Tables of Obſervations are copied from the Minutes as they were ſet down at the Time. The Diviſions of the Wooden Inſtrument being not exact, I found it neceſſary to make a Table to correct them by, which was done partly by meaſuring with Compaſſes, and partly by examining them againſt thoſe of another Inſtrument. The Corrections are every where to be ſubſtracted from the Angles obſerved, and the Errors of a Degree and three Minutes and a half, occaſioned by the miſplacing the ſecond Speculum in all the forward Obſervations of *September* the 1ſt, being of the ſame kind, are joined with them, in the ſeventh Column of the Tables of thoſe Obſervations. The laſt Column contains the Differences between the obſerved Altitudes, corrected by the 'foremention'd Table, and the Altitudes as they ought to have appeared by the Computations. Among them there are two or three which ſo much exceed any of the reſt, that for that reaſon they ſeem to be rather owing to Miſtakes, in counting the Minutes on the Inſtrument, or the Time by the Watch, than to the Errors of the Obſervations.

The greateſt Part of the Altitudes were taken by a Horizon not clear of Land, and by that Means not always ſo readily diſtinguiſhable. The Obſervers were all Perſons quite unaccuſtomed to the Motion of a Ship at Sea, which in this Caſe was generally very great and quick, the Veſſel we were in being only of about 60 Tuns Burthen, as the Maſter informed us, the ſmallneſs of which made it alſo more liable to be lifted up and let down again by the Waves: And if the Difference of Height occaſioned by that Means was about four or five Feet, as we judged it to be, it

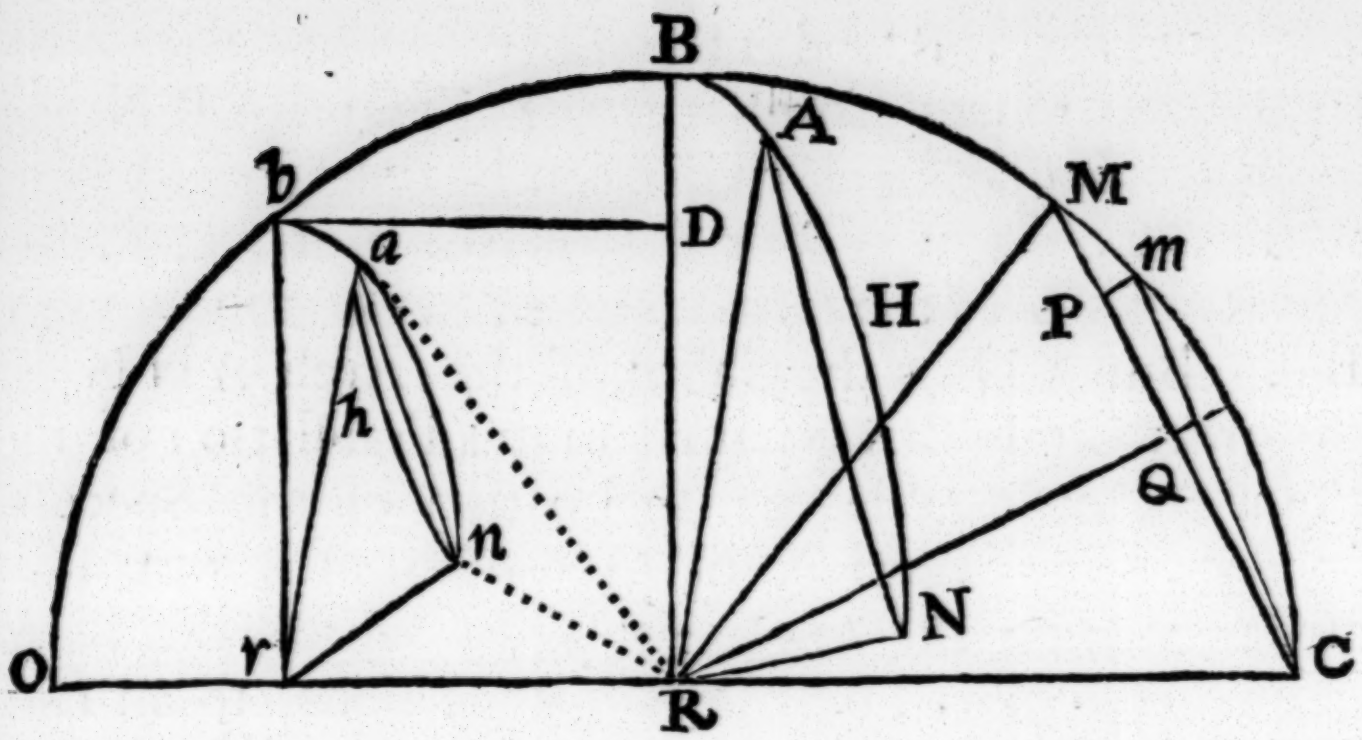
muſt neceſſarily ſink and raiſe the viſible Horizon by Turns near one Minute. The Computations of the Sun's Altitudes are all made for the Latitude of 51° 28′, whereas a good Part of them were taken under Sail, and upon different Tacks, the Veſſel ſometimes ſtanding North Eaſt or North, and at other times South Eaſt, for near a quarter of an Hour at a time.

Several of theſe Circumſtances may probably have contributed to increaſe the Inconſiſtency of the Obſervations; but as no particular Notice was taken of them at the Time, I content my ſelf with barely mentioning them.

POSTSCRIPT.

The Principle on which the Contrivance of this Inſtrument depends, was laid down in the before-mentioned *Philoſ. Tranſ.* Numb. 420. in one Propoſition, and ſeveral *Corollaries*, the fifth of which contains the Grounds of an Approximation for correcting ſome ſmall Errors which will ariſe if the Plane of the Inſtrument be ſuffered to vary too much from the great Circle paſſing through the two Objects, when the Obſervation is taken. There appears reaſon to think, that there will be very little Occaſion in Practice for that Correction; but it was neceſſary to mention it, in order to explain the Nature of the Inſtrument; and as the manner of deducing that Corollary from the Propoſition may not appear obvious to every Reader, I have here annexed the Demonſtration of it.

Let



Let O B C in the annexed Figure repreſent an infinite Sphere, at whoſe Center R are placed the two Specula inclined to one another in any given Angle, and let their common Section coincide with the Diameter O R C. Let B A N be the Circumference of a great Circle, to the Plane of which the common Section of the Specula O R C is perpendicular, and B R its Radius: Let *b a n* be the Circumference of a Circle parallel to B A N, and at the Diſtance from it B *b*: Draw *b* D the Sine, and *b r* the Sine complement of the Arch B *b*: B D is the verſed Sine of the ſame. Let A be a Point of an Object placed in the Circumference of the great Circle B A N, and N the Point in which its Image is formed by the two ſucceſſive Reflections, as before deſcribed; and let *a* be a Point of another Object placed any where in the Circumference of the Parallel *b a n*, and *n* its Image; and let *a h n* be an Arch of a great Circle paſſing through the Points *a* and *n*. The Point *a* is at the ſame Diſtance from the great Circle B A N, as the Point *b*,

i. e

i. e. at the Diſtance B *b*. Draw A R, A N, R N, *a r*, *a n*, *r n*, *a* R and *n* R.

By the fourth Corollary the Figures A R N and *a r n* are ſimilar, and conſequently the Line A N is to the Line *a n* as A R or B R is to *a r* or *b r*, *i. e.* as the Radius is to the Sine complement of the Diſtance B *b*. But A N is the Chord of the Arch A H N of the great Circle B A N equal to the Tranſlation of the Point A, or double the Inclination of the Specula, and *a n* is the Chord of the Arch *a h n* of a great Circle, meaſuring the Angle *a* R *n*, by which the Point *a* appears removed by the two Reflections, to an Eye placed in the Center R. Therefore the Tranſlation, or apparent Change of Place of the Point *a* is meaſured by an Arch of a great Circle, whoſe Chord is to the Chord of the Arch A H N (equal to double the Inclination of the Specula) as the Sine complement of its Diſtance from the great Circle B A N is to the Radius.

From any Point C of the Circumference O B C draw the Chords C M and C *m*, to the ſame Side of the Point C, and equal to the Chords A N and *a n* reſpectively, draw the Radius R M, and from R and *m* draw R Q and *m* P, both perpendicular to C M, and cutting it in Q and P. R Q is the Sine complement, and C M double the Sine of half the Angle M R C, or A R N, or of the Angle of Inclination of the Specula. The little Arch M *m* will repreſent the Difference of the apparent Tranſlations of the Objects in A and *a*; and if it be very ſmall, may be looked on as a ſtrait Line, and the little mix'd Triangle M *m* P as a rectilinear one, which will be ſimilar to R M Q, becauſe R M is perpendicular to M *m* and

R Q

R Q to C M, and the Angles at Q and P right Angles. The Line C P may be taken as equal to C *m*, and M P as the Difference of the Lines C M and C *m*. Therefore the little Arch M *m* is to the Line M P nearly as R M to R Q: But C M (*i. e.* A N) was to C *m* (*i. e. a n*) as B R to *b r*, and the Difference M P of C M and C *m* to the Difference B D of B R and *b r* as C M to B R. Therefore M *m*, the Difference of the apparent Tranſlations, is to B D, the verſed Sine of the Diſtance B *b*, or to an Arch equal to it, in the compound Ratio of R M the Radius to R Q the Sine complement of the Angle of Inclination of the Specula, and C M double the Sine of the ſame to B R the Radius, *i. e.* as C M to R Q.

The Obſervation may be corrected by one eaſy Operation in Trigonometry, as will appear from the firſt Part of this Corollary, *viz.* by taking the half of the Angle obſerved, and then finding another Angle, whoſe Sine is to the Sine of that half, as the Sine complement of the Diſtance B *b* is to the Radius: This Angle doubled, will be the true Diſtance of the Objects. But as this Operation, though eaſy, will require the uſe of Figures, I rather choſe the Method of Approximation, becauſe by that the Obſerver, retaining in his Memory the Proportions of the Sines of a few particular Arches to the Radius, may eaſily eſtimate the Correction without Figures, when the Angle is not great, and by a Line of artificial Numbers and Sines, may always determine it with greater Exactneſs than will ever be neceſſary.

When the Angle obſerved is very near 180 Degrees, the Correction may be omitted; for then it will be

eaſy

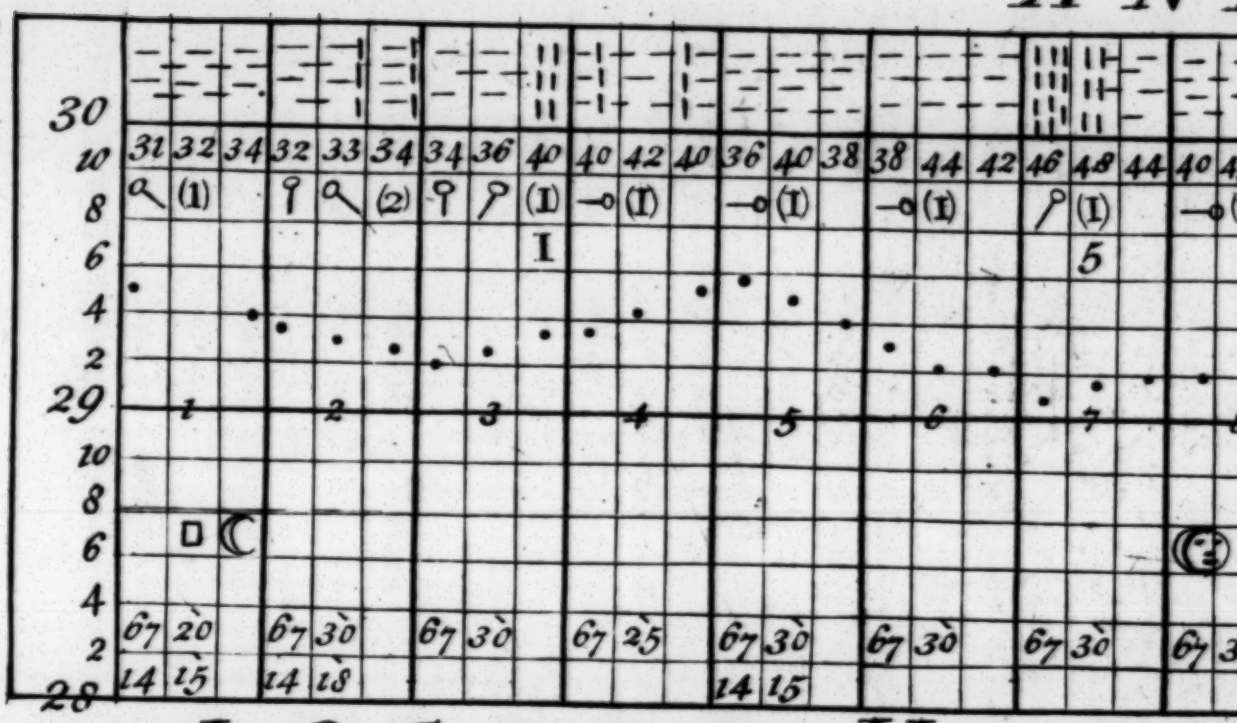
eaſy to keep the Plane of the Inſtrument ſo near that of the before-mentioned great Circle as not to want any, if the Situation of that Circle be known: If it be not, the Obſerver, when he ſees the two Objects together, may turn the Inſtrument on the Axis of the Teleſcope, 'till he finds that Poſition of it by which he obtains the leaſt Angle; and this (if the Specula are ſet truly perpendicular to the Plane of the Inſtrument) will always happen when the Objects appear to coincide in the Line *g h*, as expreſſed in the third Fig. of *Tranſ.* No 420.

In Page 152 of the ſame, a Rule is given for finding to which Hand of the Obſerver the Object ſeen by Reflection ought to lie, but is reſtrained to the particular Form of the Inſtrument there deſcribed. The general Rule is, that when the Index is brought to the beginning of the Scale (*i.e.* to 0° when the Inſtrument is deſigned for Angles under 90°, or to 90° when it is deſigned for Angles from 90° to 180°) if then a Line be imagined to be drawn on it parallel to the Axis of the Teleſcope, or Line of Direction of the Sight, ſo as to point towards the Object ſeen directly; which ever way this Line is carried by the Motion of the Index along the Arch from 0° towards 90° in the firſt Caſe, or from 90° towards 180° in the ſecond, the ſame way the Object ſeen by Reflection ought to lie from that which is ſeen directly.

Erratum, Pag. 154. Line 24, read, *They may be either of Metal, or Glaſs Plates foil'd, having their two Surfaces*, &c.

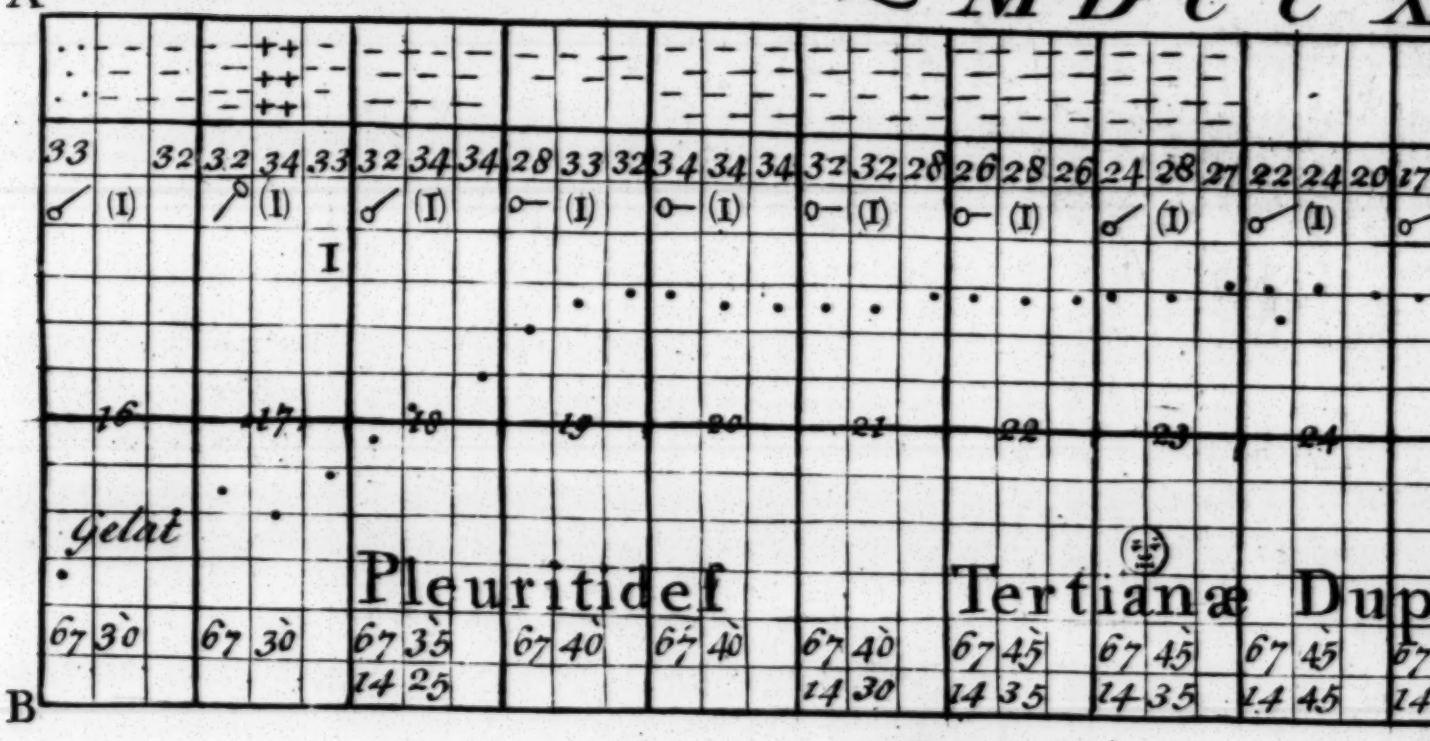
II. Ephe-

EPHEMERIDES
ANNI



=LOGICÆ ULTR

~MDCCX



EXPLICATIO

Altitudo Barometri

Altitudo Thermometri
indicatur numeris suprema in serie cujus-libet mensis scriptis

Ventorum Vires et Plaga
(1) (2) (3) (4)

Lunæ phases

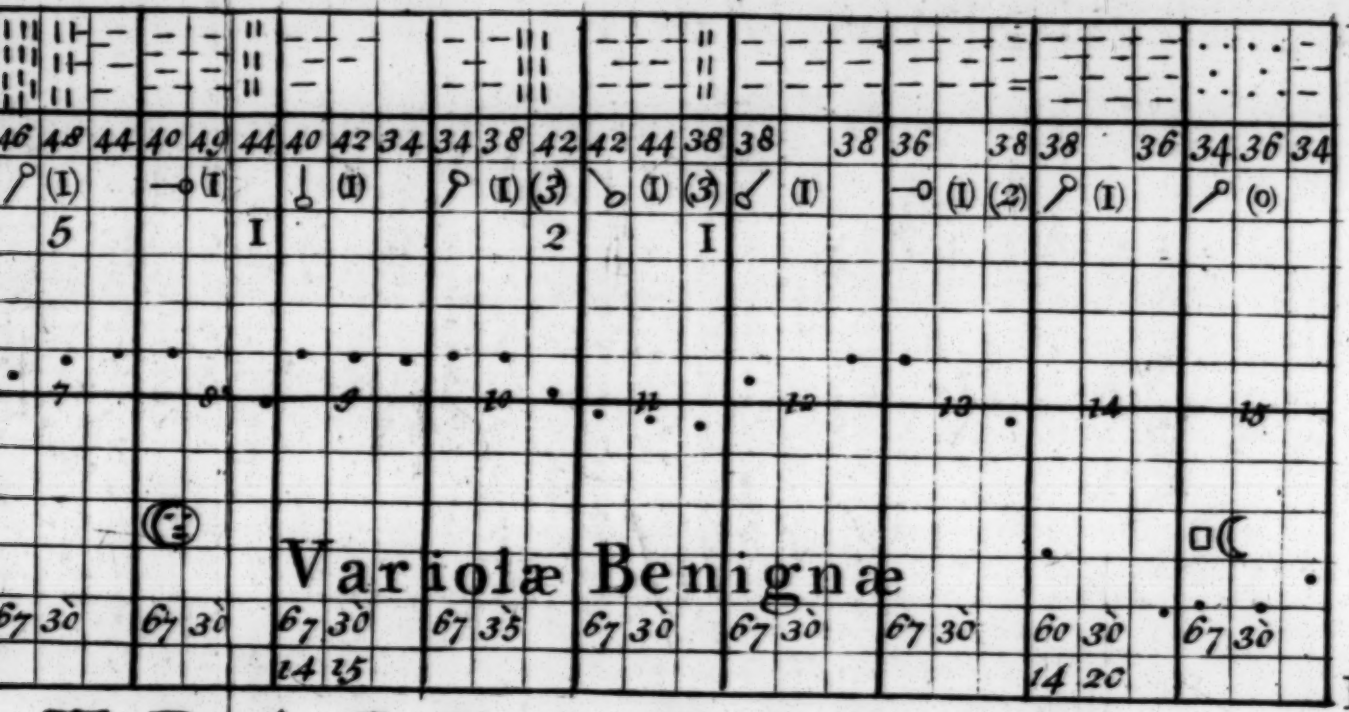
M 74. (&c) *Mortuorum numerus.*

DES METEORO = TAB. I.

ANNI ~

Philosoph. Transanct. Nº 425.

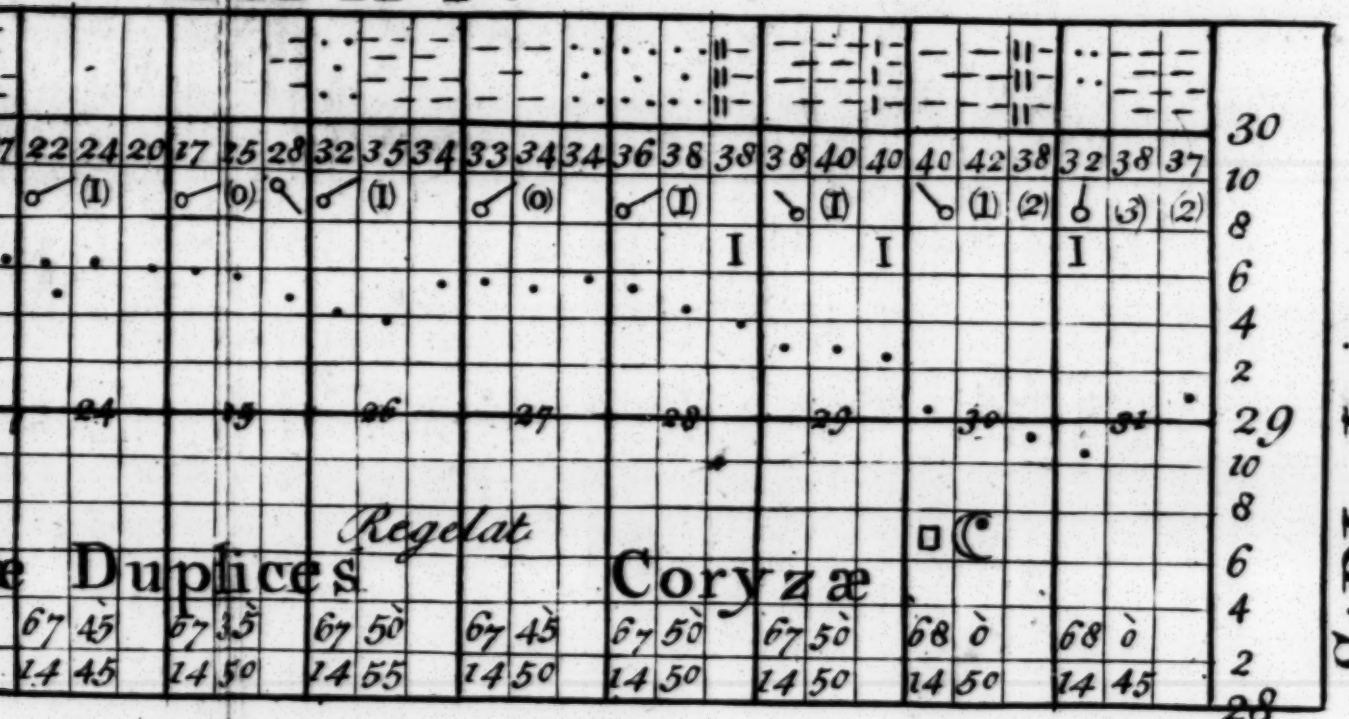
A



B

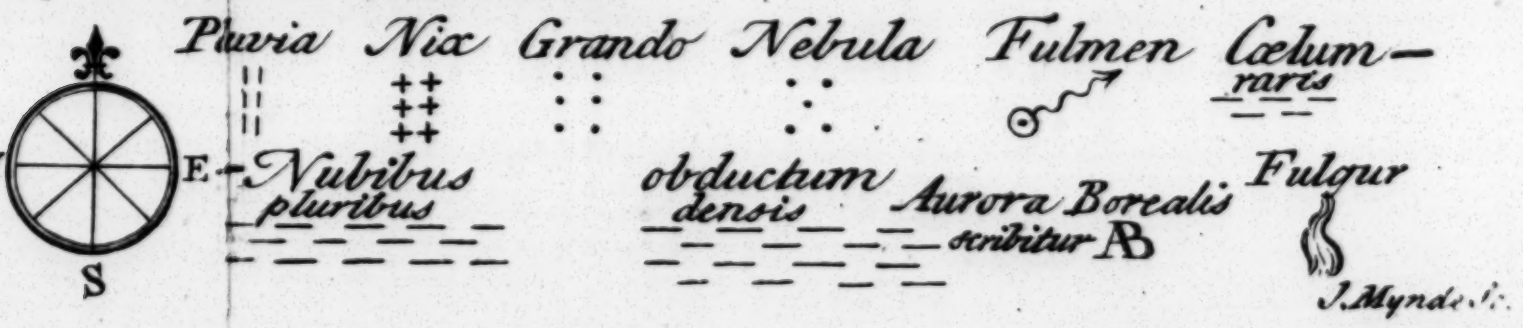
TRAJECTINAE

CCXXXI.



S. PL. Lin. 14.
Evap. Lin. 3.

ATIO SIGNORUM



P 354 V 2

Fig. 1.

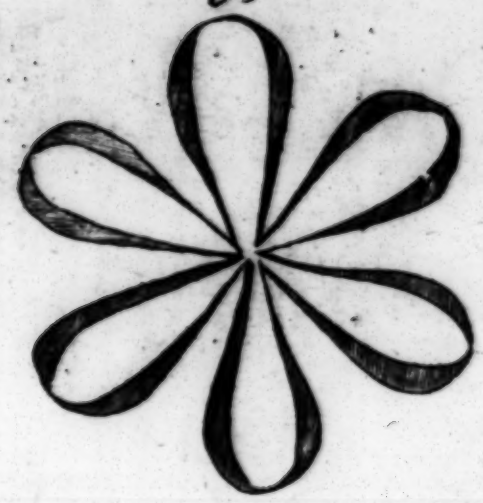


Fig. 2.

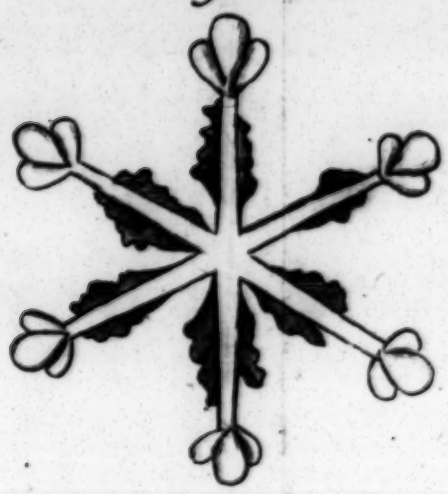


Fig. 3.

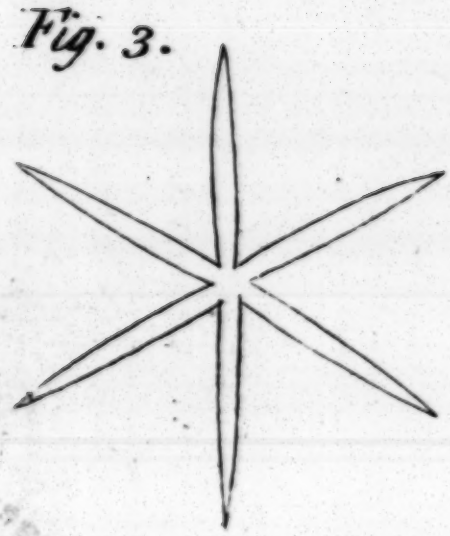


Fig. 4.

Fig. 6

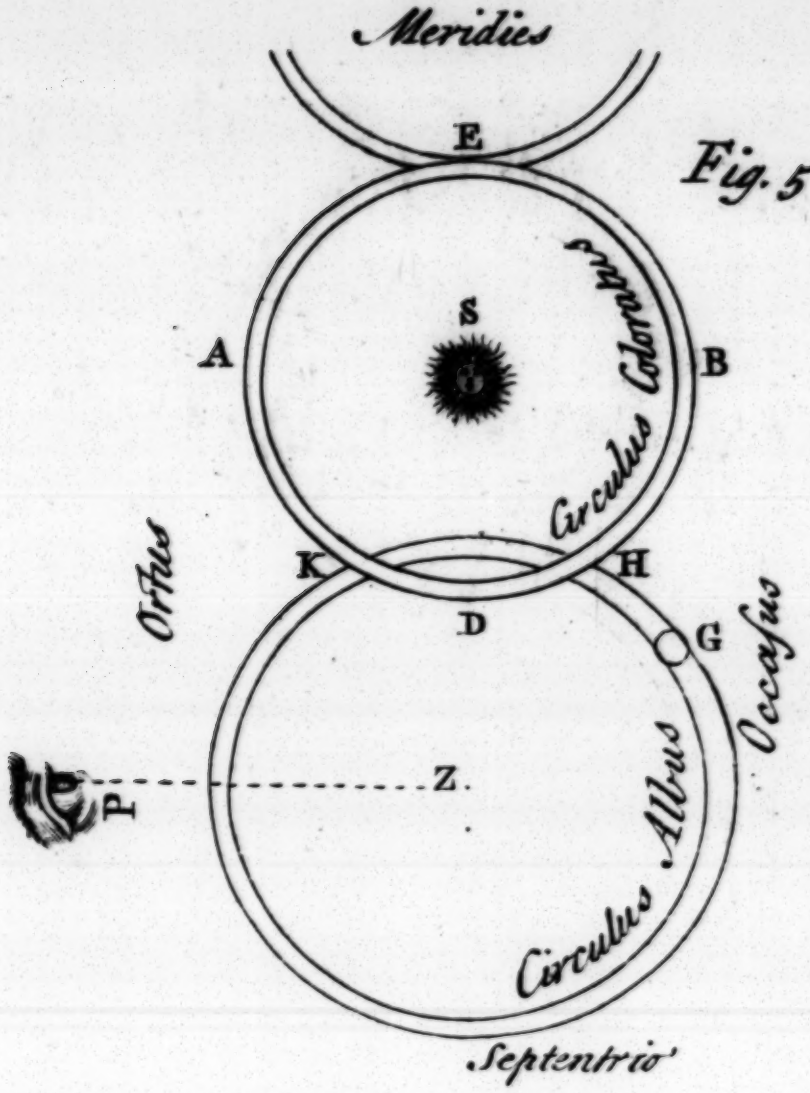
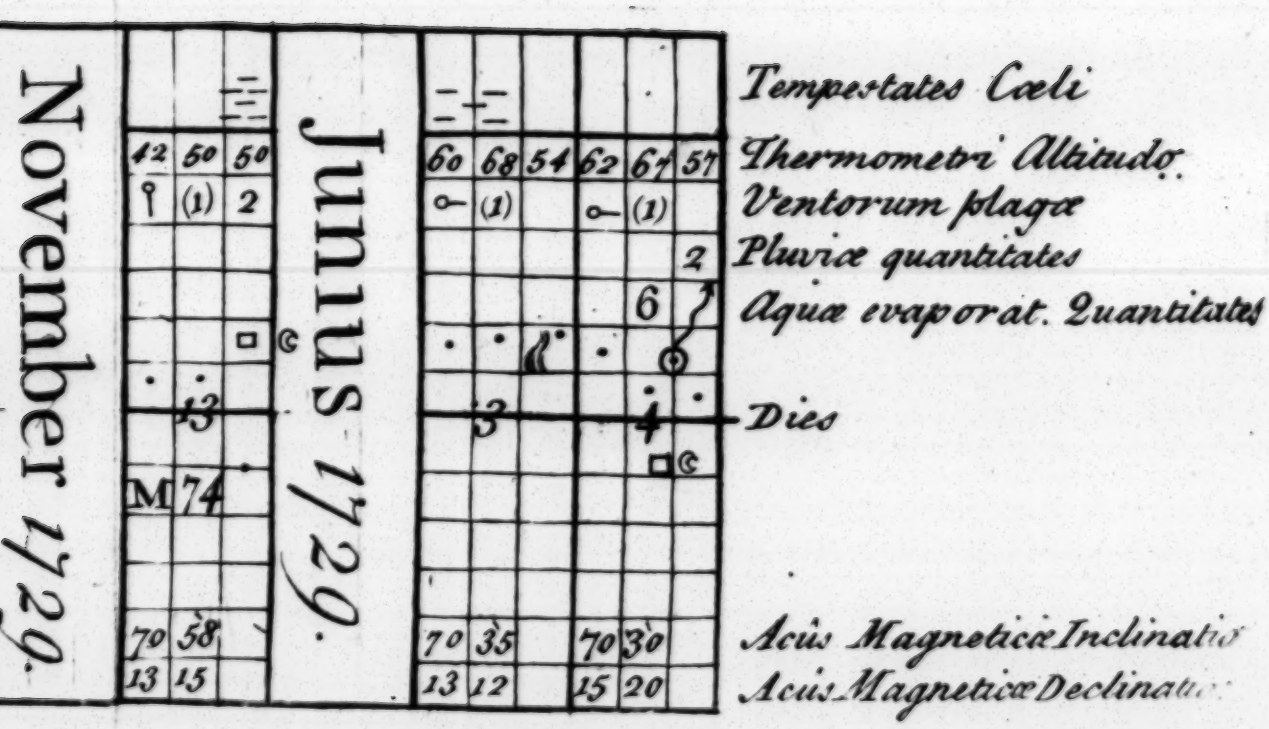

Meridies
E
S
A
B
Circulus Coloratus
Ortus
K
H
Circulus
D
G
Occasus
P
Z
Circulus Albus
Septentrio

Fig. 5.


November 1729.
Junius 1729.
Tempestates Cœli
Thermometri Altitudo
Ventorum plagæ
Pluviæ quantitates
Aquæ evaporat. Quantitates
Dies
Acûs Magneticæ Inclinatio
Acûs Magneticæ Declinatio
12 50 50
(1) 2
13
M 74
70 58
13 15
60 68 54 62 67 57
(1) (1) 2
6
3 4
70 35 70 30
13 12 15 20

J. Mynd

II. EPHEMERIDES METEOROLOGICÆ, Barometricæ, Thermometricæ, Epidemicæ, Magneticæ, ULTRAJECTINÆ, *conſcripta à* Petro Van Muſchenbroek, *L. A. M. Med. & Phil. D. Phil. & Matheſ. Profeſſ. in Acad.* Ultraj. Anno 1729.

EPhemerides hæ *Meteorologicæ* notantur pro ſingulo anno in Tabula chartacea maxima, quæ duodecem Areolas continet, pro unoquoque menſe unam, quarum Illam menſis Januarii anni 1731. Speciminis gratiâ in TAB. I. apponitur: Quoniam autem omnia ſigna in cæteris Tabulæ partibus uſurpata in hoc menſe non occurrunt, in TAB. II. ad Fig. 6. alia ſpecimina nonnullorum Dierum diverſorum Annorum, quæ cuncta complectuntur ſigna, adjunguntur. In calce TAB. I. ſigna, quibus uſus fui, in Meteoris annotandis, explicata habentur, unde cuncta in hujuſcemodi TABULIS METEOROLOGICIS conſtruendis neceſſaria facilè & primo intuitu intelligentur. Cum plena eorum, quæ in hiſce Ephemeridibus annotantur, hîc loci futura ſit nimis prolixa Enarratio, res ſolummodo magis notabiles recenſebo.

Siniſtro Tabulæ lateri menſis nomen ponitur, huic dextrum verſus adjacent numeri altitudinem Barometri in pollicibus Rhenolandicis, eorumque lineis indicantes, hi parte infima incipiunt a 28, deſinuntque in 30, quia raro in hiſce provinciis Mercurius ad minorem altitudinem quam 28 pollicum in tubo deprimitur,

rariſſime ad 30 uſque pollices adſcendit: commodè idcirco omnis altitudinis varietas, cui Mercurius in Barometro ſubjicitur, intra aſſignatos hos numeros ſcribi potuit; idque ſolius puncti ope, poſiti accurate in loco, qui Mercurii altitudinem exprimebat: Captæ ſunt Barometricæ obſervationes ter quocunque die, manè horâ ſeptimâ; in ipſa meridie; et veſperi horâ undecimâ; quibus temporibus quoque Thermometri altitudines fuerunt notatæ. Thermometro uſus fui, Mercurii pleno, quod dexterrimus artifex Fahrenheytius ſecundum ſuam tabulam fecerat, cujus conſtruendi modum tradidi in commentariis, quos Florentinis tentaminibus experimentalibus adjunxi: ſcala ita ſe habet, ut Mercurius in tubo deſcendat ad graduum initium, ſive 0, cum Thermoſcopium hyeme Nivi cum Sale Ammoniaco permiſtæ imponitur; inde ſurſum verſus gradus 32 eſt, cum aqua gelare incipit; gradus eſt 214, ad quem aſſurgit Mercurius, cum ebullienti aquæ tubus immiſſus fuerit: quæ pauca notata ſufficiunt: ſuſpenſum in aperto aëre, ſed umbroſo manet ſemper hoc Thermoſcopium, ita ut vere Atmoſpherici aëris calorem friguſve indicet. Vides in Tabula Meteorologica numerum 29 pro Barometro, ab eo per medium menſis dextrum verſus ſcripti ſunt dies menſis ab 1 ad 31, lineis nigrioribus diſtincti cum ſuis numeris, quilibet dies binis tenuioribus intermediis lineis, in tria diſtinguntur ſpatia, tribus quotidianis obſervationibus deſtinata, quæ memoratis horis captæ ſunt: obſervationes Thermometricæ ſcribuntur in ſerie ſuprema menſis, à ſiniſtris dextrorſum: Ventos, eorum plagas & vires excipit ſeries ſecunda. Pluviæ copiam capit tertia ſeries; hanc colligo ſimili methodo ac in obſervatorio Pariſienſi.

In

In quarta ſerie numeri denotant copiam aquæ, quæ ex vaſe aperto, ſed umbroſo in loco poſito, in auras exhalat. Eſt hoc vas plumbeum accurate parallelepipedum, cujus quodlibet ſupremum latus 6 pollicum, altitudo 18 pollicum; hoc impletur ſingulo menſe ad altitudinem 16 pollicum, & curatur, ut ſemper aqua duobus pollicibus ſit margine ſupremo depreſſior. In alia ſerie notavi Lunæ phaſes, ut viderem quaſnam mutationes hic planeta noſtræ Atmoſpheræ induceret. Denique in ſerie undecima habetur Inclinatio Acûs magneticæ, qualis ipſa meridie fuit: eſt hæc acus quatuor longa pedes, quâ, opinor, nullam exſtare æque perfectam, ejus deſcriptionem tradidi in Diſſertationibus Magneticis, pag. 190. Tandem in ſerie infima conſpicitur Declinatio Acus Magneticæ, 6 pollices longæ, incluſæque Machinæ, quam in Diſſertationibus Magneticis, pag. 233, delineavi: hæc inſiſtit grandi lapidi plano, medio in horto, ita ut recta, quæ per notam ſeptentrionis & meridiei tranſit, veræ lineæ meridianæ inſiſtat: ita facillime & abſque ullo labore, quocunque tempore Magneticæ acûs declinationem obſervare licet; tempus ipſum meridianum ſemper elegi, ut melius Inclinationem cum Declinatione comparare poſſem. Hæc Tabulis Meteorologicis intelligendis ſufficiunt; addam nunc alia, quæ Tabulis inſeri nequeunt, quæque præter notata animadverti.

Regnavit menſe *Januario* intenſum frigus, præcipue die ſexto, undecimo & decimo nono, dubitoque utrum in his regionibus quis unquam acrius gelu obſervaverit, cum Thermoſcopium ad gradum uſque quartum ſubſederit: interim a 1 ad 15 *Januarii* erat humilior Mercurius in Barometro, quam, cum

 gelat,

gelat, apud nos esse solet: præterea gelávit vento ex qualibet mundi plaga spirante, quod non admodum frequenter contingit: plerumque die uno vel altero præcedente Lunæ phasin, sive ea plena sive nova, sive in quadraturis fuerit, mutabatur tempestas remittente aliquantum gelu: tantam hoc sidus in aërem nostrum efficaciam habet, quo tempore enim maxime gravitare incipit in terram, atque hæc in ipsam, condensari videntur quoque nubes, coeuntesque vaporosæ particulæ graviores fieri; quam ut ab aëre in æquilibrio sustineantur, decidunt ita sub forma pluviæ, nivis, grandinisve, & ventos suscitant, qui suo attritu calorem gignunt, utque regelet, faciunt. Memoranda est nivis forma, quæ ante meridiem diei sexti cecidit; erat nix omnis rosacea stellata, aut ex partibus semiformatarum Stellarum, ruptarumve constabat: Microscopio eam sollicite inspexi, videbatur esse nix quatuor specierum, omnis tamen hexangula, fere similis illi, quam Cartesius anno 1637, Amstelodami observavit, sed quam multo elegantius depinxit Hookius in Micrographiæ Schemate viii, pag. 88, aut Cassinus in Parisinæ academiæ monumentis, anni 1692. figuras Nivis a me observatas accurate delineavi in Tab. II. Fig. 1. rosaceam refert, quæ maximam faciebat partem: erat diversæ magnitudinis, quippe nonnullarum diameter partem erat $\frac{7}{100}$ pollic. Rhenol. aliarum $\frac{10}{100}$ aliarum $\frac{11}{100}$. Hujus quoque magnitudinis fuerunt flocculi figuræ 2 & 3. Ramosi autem erant alii Fig. 4. Quorum magnitudo $\frac{20}{100}$ vel $\frac{21}{100}$ pollic. Rhenol. Sed quam rara erat hæc nix! non memini me ullam similem vidisse, implevi eâ vas parallelopipedum, 12 altum pollices, quod in calido positum loco solutam nivem præbuit ad dimidii pollicis altitudinem,

dinem, adeo ut nix hæc vigesies quater aquâ rarior fuerit: hæc raritas profecto insolita, nam Sedilavius, de la Hirius aliique nivem raram aquâ esse sextuplo leviorem, hic autem nivem rarissimam duodecluplo leviorem observavit, at duplo adhuc rarior nix a nobis notata fuit. Quomodo hexangula ejusmodi progignatur nix, non exponam, variæ videantur opiniones apud Cartesium in princip. Philos. Keplerum de Nive sexangula. Erasm. Bartholinum de figura Nivis. Millietum in Tract. de Meteoris. tum Acta Philos. Britan. No. 92 & 376. Delapsa hæc nix secum terribile frigus & gelu advehebat, præcipue post horam quintam vespertinam, quod perduravit ultra horam 12 nocturnam; toto hoc tempore Vinum, quod ex profunda deferebatur cella in angulum conclavis, ubi largus exstructus erat focus, momento citius conglaciabatur, imo vix, in tabula, non procul â foco posita, à congelatione desistebat infusum Scyphis: pari modo, quicquid in glaciem abire poterat, infelicissime rigebat. Simile frigus omnia exussit undecimo hujus mensis die; verum providissimus rerum humanarum arbiter voluit, ut brevis modo esset hoc acerrimum gelu durationis, consulendo & prospiciendo multorum animantium vitæ, & vegetabilium conservationi. Alterius formæ, quam supra memini, nix rarissima cecidit octavo Januarii horâ tertiâ post meridiem; constabat ex meris tantum oblongis speculis, quæ vix $\frac{1}{10}$ pollicis parte æquabant, tenuissimæ cæteroquin, & proinde simpliciſſimi Nivis flocculi.

Duravit gelu usque ad 22 diem, unde adeo crassa evasit glacies, ut in nonnullis amplioribus fossis, aquam stagnantem comprehendentibus, eam altitudinem 20 pollicum Rhenolandicorum acquisivisse dimensus

menſus ſim: in fluvio rapide decurrente, minima glaciei craſſities fuit 12 aut 13 pollicum: utcunque craſſa fuerit, reſoluta erat penitus primo Februarij, ita ut plurimis in foſſis ſuburbanis vix glaciei indicium daretur; quæ ſubitanea contigit regelatio propter maximam pluviæ copiam, quæ poſt 22 diem cecidit.

In principio Januarij erant hinc & inde Morbilli, ſed mitioris indolis, quibus correpti infantes leviſſime ægrotabant, nulli, aut ſaltem pauciſſimi interierunt: quamdiu interim regnavit gelu, uſque ad illud tempus, quo remittere cæpit, nullis civitas laborabat fere ægritudinibus, frigore quaſi æque ex aëre ignem, ac morborum quorumcunque ſemina propellente: at ſimul ac regelabat, hoc eſt 24 Januarij, jam Anginæ & Ardentes febres Tragœdiam inchoabant, cum corpora ab acri gelu antea conſtricta, nunc à pluvioſo, tepente humidoque aëre, furibundis agitato ventis, ſubitiſſime relaxabantur, quippe increverat calor ipſâ meridie diei frigidiſſimæ a gradu 8 ad 44 die calidiſſima ſecundum Thermometri ſcalam, quem caloris mutationem intra tam anguſtam temporis ſpatium humana corpora incolumi ſanitate ferre non poſſunt. Sed præcipue ad maximam ponderis Atmoſpherici mutationem attendendum eſt, ſubſedit enim in Barometro Mercurius nocte inter 24 & 25 diem intermedia adeo celeriter, ut vix meminerim rapidioris Mercurij delapſus; ſtetitque in humillima fere ſtatione parum ſupra 28 pollices; quoniam igitur humani corporis ſanguifera vaſa, antea a magno Atmoſpheræ pondere compreſſa, & ab intenſiſſimo frigore magis adhuc conſtricta; nunc citiſſime relaxabantur, tam a calore, quam ab Atmoſpheræ leviſſimo pondere,

non

non potuit non ſanguis errore loci in vaſa tam ſubito aperta irruere, atque inflammationem, hanc vero febrim cum aliis ſymptomatibus ſuſcitare.

Lubet autem Anginarum tum regnantium brevem adnectare hiſtoriam, quia hæ non ſemper ejuſdem naturæ ſunt, eam igitur ex propriis obſervationibus depromam. Saniſſimos, eoſque qui cubitum euntes nullam alicujus ægritudinis indicium perceperant, mediâ nocte corripuit Angina, inflammans ſubito amygdalam dextram, uti in pleriſque contigit: mox acceſſit febris, cum capitis dolore, rigore cervicis & dorſi, quod etiam non aliter frigere credebatur quam ſi frigidâ perfuſum fuiſſet. Sequenti die cum eodem dorſi rigore febris perſtitit, homotonos: nonnulli quos levior corriperat febris, alterâ nocte in largiſſimos ſponte illapſi ſudores, mane ſurgebant ſani, prorſus a morbo liberati, ſed plus debilitati, quam a tam brevis durationis febre contingere ſolet: quod latentis alicujus malignitatis ſuſpicionem incuſſit. Non adeo beati alii fuerunt, acriori febre laborantes, his enim Angina increvit uſque ad tertium diem, etiamſi liberalis Venæ ſectio & larga purgatio alvi a principio morbi inſtituta fuerit; quæ bina tamen bis terve repetita levamen tertio die attulerunt: interim Urinæ erant flammeæ, fætentes inſigniter: ſudores nulli, nulluſque ſomnus, capitis ingens dolor, artuumque omnium Laſſitudo, ac ſi fuſtigati fuiſſent: lingua vix obducta: evanuit morbus in nonnullis quinto die, cujus criſis largus ſudor fuit, manente Urinâ per totum morbi decurſum rubicunda, limpida. Corripuit hæc Angina abſque diſcrimine Infantes & Adultos. In multis, ab Angina jam curatis, poſt biduum recruduit febris continua, à quâ ægroti non niſi ſex

ſeptemve

ſeptemve diebus elapſis curabantur. Jam ab aliquot retro obſervavi annis, hyeme poſt præteritum gelu Anginas increbeſcere ſimul ac regelare incipit; præcipue ſi ſubito regelet.

Sæviebant præterea aliæ Febres continuæ, ardentes, quotidie circa veſperam, novo comitante frigore, exacerbatæ: Ægrotantibus lingua erat arida, fuſca, ſitis magna, inſomnolentia, deliria; capitis dolores cruciantes, per totum morbi decurſum continuati; oculi fixi, & quaſi immobiles, cum ſcintillis obvolitantibus: nonnullis abdomen inferiori parte rigebat, atque hi non niſi cum difficultate urinam dimittebant: aliorum cervicem prorſus rigidam reddidit febris: aliis totum corpus ſtatuæ inſtar rigebat, hi nec videre nec audire, nec ſe movere per biduum ante mortem poterant. Alii crebris convulſionibus agitabantur aliquot ante obitum diebus: plurimi moriebantur decimo quarto die, ab invaſione morbi prima ſupputando, nullum evaſiſſe obſervavi, cui in morbi principio ſanguis liberaliter eductus non fuit; etiamſi remediis diluentibus, humectantibus, refrigerantibus fuerit uſus: ſed plerumque incolumes evaſerunt, quibus larga & repetita ſecta fuit Vena: ſanguis eductus non multum a ſano ſtatu receſſiſſe videbatur, gerens vix ulla Inflammationis veſtigia. Debiliores nonnunquam aphthis corripiebantur, denſis, flavis, certo lethiferis: obſervavi hanc febrim æque in Infantibus ac in Adultis.

Quoniam in doctrina Magnetica ætatem terere in animum induxi, quotidie Inclinationem & Declinationem acuum ipſâ meridie obſervavi: Miratus ſum non mutari Declinationem, quo tempore inclinatio mutatur: quod non tantum hoc menſe Januario ita ſe habuit, ſed tribus annis, quibus obſervandæ huic

tenet fama esse præsagium imminentis tempestatis, quod fabulosum videtur, sequenti enim die cœlum tranquillum fuit.

Vigesimo quinto hujus mensis plurimi Coryza correpti sunt homines, cum a 20 ad 24 magnus, ratione temporis habita, in Atmosphæra obtinuerat calor, qui totum humanum corpus laxaverat ; supervenit nox 24 diei frigida, flante Boreâ, hinc illico constringebantur vasa à frigore, suscitataque fuit inflammatio in membranis aëri maxime expositis : vix ullas pertinaciores hisce animadverti Coryzas, inflammatione membranæ Schneiderianæ proserpente per totam Asperam arteriam usque in Pulmones ; hinc tussis, quæ interdiu quidem mitis & rara, sed exacerbabatur ab horâ nocturnâ undecimâ usque ad tertiam, a quo tempore mitescens, ægrotis requiem concedebat : molestissima hæc tussis trium, quatuor, imo plurium septimanarum spatio duravit, quibusvis resistens auxiliis, Venæ sectioni, purgantibus, sudoriferis, emollientibus, humectantibus, narcoticis, expectorantibus : optime aliquando auscultabat revulsioni factæ ope Tabaci Brasiliënsis, e quo turundæ naribus immissæ maximam irritationem, & versus nares materiæ acris derivationem præstiterunt : quæ huic quoque restitit remedio, tussis, tantum temporis longinquitate curata fuit. Maxima Inclinatio magneticæ acus fuit 69° 30′, minima 68° 25′. Maxima declinatio fuit 13° 20′, minima vero 13° 10′.

Martij 27, hora vespertina 10 ½ prima hujus anni à me conspicebatur *Aurora Borealis*, aliquantum insolitis stipata apparitionibus : a plaga cœli Boreâ occasum versus, usque ad plagam N. W. t. N. tum à Boreâ quoque ortum versus, usque ad plagam N. N. O.

ab

huic rei incubui, idem obtinere animadverti. Novis Magneticis viribus impregnaveram primo Januarii utramque acum, ut quamdiu vis illibata in ferro maneret notare quoque poſſem: in acu Inclinatoria ſatis generoſa 2 ½ annorum ſpatio perſtitit, non diutius: quamdiu in vulgari Verſorio conſtabit, propter infortunium infra memorandum determinare nequeo, æque diuturnam tamen ac vim priorem fore, nullus dubito, novi enim vulgares Compaſſus in navibus ex Orientali India noſtros in portus redeuntibus, adhuc dum vigere, qui ſolventes abhinc Magnetica virtute impregnati fuerant. Attende ad ventos, hos in Magnetem imperium non habere obſervabis, quippe Inclinatio & Declinatio variat duobus ſe ſequentibus diebus, quibus tamen idem ventus ſpiravit: altera occaſione ex alia plaga ſpirante Vento diebus binis ſibi proximis, immobilem perſtitiſſe Inclinationem una cum Declinatione notabis. Multo minus aut cœli ſerenitas, pluvia, nix, tempeſtas, aliquid in vim Magneticam operantur: Nam ſæpe obſervavi unius menſis ſpatio oſcillatorio actam fuiſſe motu æque acum Inclinatoriam ac Declinatoriam; nunc enim Inclinatio major, nunc iterum minor eſt, & verſus Occaſum quæ nunc datur Declinatio, hodie increſcit, cras decreſcit, major iterum ſequenti die. Diſcrimen inter Inclinationem minimam, quæ fuit 67 gradum, & maximam, quæ fuit 68° 28′, eſt 1° 28′. Declinatio verſus occaſum minima 12° 40′, & maxima 13° 20′, dat diſcrimen 40 Minutorum.

Februarij octavo dabatur Halo circa Lunam, ab hora 7 ad 9 ½ veſpertinam, ejus diameter erat 3 ½ vicibus major, quam Lunæ apparens diameter erat;

ab horizonte uſque ad altitudinem 20 graduum, obductum erat cœlum nube tenuiſſimâ, & quidem adeo rarâ, ut Stellæ ſecundæ & tertiæ magnitudinis per eam tranſlucerent, lucebat tamen notabiliter : ſuperior ejus limbus inæquali margine deſcriptus erat : ex loco ejus quodam intermedio columna exſurgebat, in horizontem perpendicularis, 10 gradibus ſupra ſupremum eminens limbum, tranſeuns per mediam Caſſiopeam, ejus lux erat æquabilis, placida, nequaquam mota, & diutiſſime perſtabat : imo nec ex nube ulli radii columnæve igneæ, quales emitti in auroris hujuſmodi ſolent, excutiebantur : fuit igitur hæc aurora ultra ſolitum placida, cœlum erat cæteroquin admodum ſerenum, ſpirante Euro ſatis valido, impetuſque ſecundi : verum ſupra Venti hujus regionem materia hujus Auroræ in abſoluta ſuſpendebatur tranquillitate : adeoque ad inſignem altitudinem ejuſmodi materia ſive propter levitatem, raritatemve, in atmoſphera adſcendere videtur, uti quoque ex aliis obſervationibus probari facile poſſet.

Sequente die reliquiæ hujus auroræ adhuc aderant, componebant tantum nubeculam tenuem, vix lucidam, non ultra 20 gradus ſupra horizontem elevatam, neque emittentem ullos lucentes radios columnaſve, nec a Borea longe Ortum aut Occaſum verſus porrectam ; fulgebat adhuc mediâ nocte, poſtea evanuit nullo ſui relicto ſigno.

Interim hoc menſe ſiccior vix ullus unquam fuit, cum pluviæ copia modo lineam 1 $\frac{1}{4}$ adæquaverit : in principio ſatis ſtrenue gelavit, ita ut decimo Martij omnium foſſarum glacies adeo denſa evaſerit, ut quaquaverſum iter calepodiis ferratis incedendi conceſſerit civibus, neque ulla navibus via libera fuerit,

verum duodecimo *Martij* gelu aliquantum remittente; Sol per purum aërem tam fortiter interdiu radios ſuos in glaciem vibrabat, ut magna ejus pars decimo tertio die liquefacta fuerit, & navis hac veſpera ex noſtræ urbis portu ſoluta Amſtelodamum petierit; quæ ambo, gelu nempe tam intenſum hoc menſe, & tam celeris regelatio, in his regionibus rariora ſunt. Tam ſubita aëris mutatio non poterat non morborum eſſe cauſa, imo hinc illico dabatur Pleuritis et Peripneumonia, quæ utraque mitis & benigni moris fuit: quippe in Pleuriticis febris quidem primo die fuit continua, ſed exigua, cum leviuſculo lateris punctorio dolore, occupante Thoracis ſuperiorem anterioremque partem: ſequenti die uſque ad inferiores coſtas dolor deſcendit, interim ſputa excreabantur flava, ſtriis interſperſis ſanguineis, tuſſis nec moleſta, nec frequens: alvus ſatis naturalis, ſomnus bonus atque reficiens, linguæ color vix mutatus, parva ſitis, Urina parum intenſior ſolito, limpida: quæ optima profecto mitiſſimæ indolis erant indicia: tertio etiam die febris una cum omnibus ſymptomatis penitus ceſſabat: curabatur hæc pleuritis reſolutione benignâ naturæ, abſque Venæ ſectione, ſed copioſa ptiſanæ potatione, uſu mellis, leviorumque Ciborum; potiſſimum afflixit hic morbus ſenes & adultos.

Eodem tempore in Scenam prodibat Peripneumonia, incipiens cum capitis magno dolore, febre exigua, pectoris anguſtiâ modica, reſpiratione ſolito breviori: ilico tamen magna ægros infirmavit debilitas, quo plus mali latere ſuſpicatus fuiſſem, niſi Pleuritides, tum graſſantes, adeo benigne fuiſſent: ſanguis Venæ ſectione eductus, nequaquam inflammati ſpeciem præbebat, ſed naturalis inſtar erat:

Urinæ

Urinæ intenſioris rubedinis, ſudor moderatus; ſomnus quoque modicus, quietus, ſemper reficiens: jam abhinc ſecundo aut tertio die in urina nubecula dabatur, ſatis gravis: ſputa excreabantur levia & tenuia, tuſſis admodum moleſta, capitis dolorem exacerbans, ſitis modica, linguæ dorſum ruffeſcens, alvus conſtipata; poſtero die mitigatior febris, Urina materiæ criticæ plena; qualis ſequentibus diebus manſit, adeo ut morbus omnino intra ſeptem octove dies terminatus fuerit: tuſſis autem aliquanto pertinacior diebus duobus tribuſve ulterius durabat, fugata tamen feliciter uſu mellis: vix poſtulabat hic morbus medici auxilium, evanuitque, ſive ſecta vel non ſecta fuerit Vena; ſive remedia, ſive nulla fere propinata fuerint. Verum ſub finem Martij multo atrocior peripneumonia graſſari cœpit, cum ſpirante Euro noctu gelabat, interdiu autem cœlo admodum ſereno Atmoſphæra meridianis horis non parum calebat, uſque ad gradum 54, 58, 59 Thermoſcopii: ejuſmodi caloris frigoriſque ſubitaneis viciſſitudinibus ferendis humana corpora vix paria ſunt, quin in acutiſſimos incidant morbos: ideo perquam acuta febris, quotidie circa veſperam exacerbata, cum frequentiſſima tuſſi, ægros extemplo corripuit, ſanguinemque admodum inflammatum reddidit, uti Venæ ſectione apparebat: ſingularia ſymptomata per totum morbi decurſum non adfuerunt, perierunt ſolito plures ægroti, qui evaſerunt, quatuordecim dierum curriculo decubuerunt.

Inclinatio acus Magneticæ maxima hoc menſe fuit 70 graduum, minima 68° 10′. Declinatio maxima 13° 40′, minima 13° 15′. Suppeditavit *Aprilis* 28 ante meridiem pulcherrimum Phænomenon, quod hora 10 $\frac{1}{2}$ detexi,

detexi, verum quod uſque ad horam 11 $\frac{1}{4}$ ſpectatum fuit.

TAB. II. *Fig.* 5. Ut clare hoc intelligas, concipe ſpectatorem P faciem verſus Auſtrum, dorſum verſus Boream direxiſſe, atque ita oculos ad cœlum ſuſtuliſſe, apparebant tum duo circuli in cœlo cum interrupta parte alterius, quorum omnium planum erat ad horizontem parallelum: erat ſpectatoris Zenith Z, centrum circuli maximi F K H G, ſive potius annuli, cujus diameter interna fuit 58° 15′, latitudinem autem non bene metiri poteram, judicabam eſſe majorem 30 minutis: nullos quoque in ipſo detexi colores, & tantum apparebat albus. Secundi circuli A B D centrum occupabat Sol S, ſecans priorem in duobus locis K, H. Eumque aliquouſque ingreſſus: ab altera ſectione H, in circulo priori albo erat locus aliquis G, ſplendidior reliquo magnitudinis ejuſdem apparentis cum ſole, à parte Solem ſpectante coloribus erat variegatus, diſtantia H G fuit 50° 30′, diameter interna circuli A B erat 45° 30′, coloribus tingebatur hic circulus variis, a parte interna Solem verſus rubebat, extima parte albebat, intermedij colores erant cœrulei pallidi; clariſſime conſpiciebantur in tractu D aliquouſque protenſo: mirebar hunc circulum non fuiſſe ubivis æque latum, ſed anguſtiſſimum eſſe in K D H. Latitudo hujus annuli fere duplo minor priori mihi viſa fuit, non tamen pro voto ſatis accurate dimenſus fui. Tangebatur hic circulus ab arcu aliquo circuli tertii E, maxime meridionalis, qui quoque albus, omnibuſque coloribus deſtitutus videbatur: Hic arcus primus omnium à conſpectu evanuit: tum pars orientalis A circuli colorati auſugiebat, quam pars meridionalis E ſequebatur:

batur: tum peribat quoque portio F orientalis circuli albi: cujus interitum ſequebatur occidentalis pars B circuli colorati; mox evaneſcebat occidentalis portio G circuli albi, ejuſque tandem pars maxime ſeptentrionalis.

Cœlum toto hoc tempore erat exiguis nubibus, hinc inde quaſi interruptis obductum, non quidem denſis, ſed quoque non admodum raris, quæ tamen altiſſima in atmoſphæræ regione ſuſpenſæ videbantur: durante phænomeno ventus flabat Euro boreus, inter primum & ſecundum impetum: qui increvit ad ſecundum gradum evaneſcente phænomeno, atque ita horæ ſpatio perſtitit, lenior iterum poſtea. Contigit hoc tempore Novilunij, atmoſphæræ calore temperato: ſollicitus attendi, an quædam corpuſcula è cœlo deciderent, ſive glacialia ſive aquea, quibus ceu cauſæ adſcribi apparitio circulorum potuiſſet, quemadmodum in Pareliis contigiſſe Hugenius, Maraldus aliique eruditi annotarunt, verum nihil collegi aut obſervavi: relatum eodem die a viris fide dignis mihi fuit, binis præcedentibus diebus ſeſe ante meridiem circa Solem annulum animadvertiſſe; quem cum non viderim, nihil de illo affero.

Obſervavi hoc menſe morbillos, etiamſi non frequentes, mitioris quoque genij, ita ut nullum infantem, meæ curæ commiſſum, trucidarint. Circa medium hujus menſis, calore jam relaxante corpora, diuturno hyemali frigore conſtricta, inceperunt Tertianæ intermittentes, quæ omnes, uti Vernales plerumque eſſe ſolent, erant benigni moris, increſcebant tribus primis paroxyſmis, tum decreverunt, ceſſantes ut plurimum intra ſex paroxyſmos, vel ſuâ ſponte,

vel

vel uſu amarorum calefacientum, aut aliquorum Salium lixivioſorum.

Tertianæ duplices quidem paulum pertinaciores, ſed adeo faciles curatu tamen, ut non parum honoris medicinæ tribuerint.

Hinc inde peripneumoniâ ſenes tentabantur, admodum lethali, nulli remedio auſcultante morbo.

Inclinatio magneticæ acus maxima fuit hoc menſe 71 gradum, minima 68° 45′. Declinatio acus maxima 13° 35′, minima 13° 10′.

Maij principium non niſi ingratos acris hyemis & triſtes diuturni frigoris effectus ſpectandos præbebat, nulla enim arbos gemmas protruſerat, niſi quod hinc inde mala Armeniaca & Perſica, Soli maxime expoſita in tepentibus locis vento non expoſitis floris conglobata petala oſtendere incipiebant: ſero admodum: Tiliæ, ambulacra urbis ornantes, triſtes adhuc & abſque foliorum indiciis, nec lætiora erant adhuc prata: verum poſt diem vigeſimum calor effuſis quaſi a Sole Venis omne Vegetabile perfudit, ita ut impetu facto prorumperunt folia floreſque ex arboribus, molliumque herbarum cacumina increſcere ad ſpectatoris oculos feſtinarint: quod annum admodum fertilem reddidit, abundarunt mala Armeniaca & Perſica, ſuo poſtea tempore probe matura. Liberaliſſimam Ceres ſuorum fructuum colonis largita eſt meſſem, cum æſtas & autumnus cœlo fruebantur ſereno, calido, modicâ irriguo pluviâ. In his regionibus jamdiu obſervatum eſt; hyemem diuturnam, non nimis acrem, vernalem calorem ſero venientem, annum fertilem portendere, nam plerumque in principio Maij noctes frigidæ, imo gelantes, dantur; corrumpentes tenellos florum fructuumque embryones;

quam-

quamobrem ſi hi ſero prorumpant, certam ſpem fructuum relinquunt.

Quarto *Maij* hora decima veſpertina ambiebatur Luna coronâ, in quâ nihil inſolens, eam quoque nec ſecuta eſt tempeſtas, nec impetuoſior ventus.

Poſt vigeſimum quintum, Fluvius Lecca, ſeſquimilliaris diſtantia ab hac urbe fluens, tanta aquæ copia impletus erat, ut prope Batavodurum aggeres ſuperaverit; infra hanc urbem oceanum verſus, quinque pollices altius ſtetit aqua, quam erat nota periculi imminentis, quæ nonnullis aggerum locis impoſita eſt; manabat aqua ex Rheni ſcaturigine, excipientis nives vernali calore celeriter ſolutas: Nivis autem prodigioſa quantitas cecidit circa Genevam a 16 Maij ad 20, quæ omnes operuit vias, quod ea anni tempeſtate in illis terræ locis oppido rarum: hæc nix ſoluta Rhenum adeo turgefecerat, hic Leccam.

Una cum menſe inchoabant Pleuritides mites, in quibus vulgaria modo ſymptomata, fugabanturque ſatis cito, Venæ ſectione, refrigerantibus diluentibus humectantibus. Verum inter Infantes regnavit Febris Scarlatina, inficiens omnes, quotquot eaſdem ædes inhabitabant, eaſdemve ſcholas frequentabant: primo die correpti febre Infantes, de dolore circa præcordia querebantur, qui poſteris duobus diebus eos adhuc affligebat, cum ſiti magna, hinc arida lingua albo obducta muco; febris interim continua, homotonos: ſub finem tertii diei et in principio quarti, totius corporis cutim occupaverunt exiguæ puſtulæ, planæ, adeo ſibi contiguæ, ut vix ſpatium intermedium relinquerent: hinc coccineo colore totum corpus rubebat: in facie tamen pauciores puſtulæ, palpebræ autem exiguis punctulis rubris, tenuiſſimam

acûs cuſpidem non ſuperantibus, perfoſſæ videbantur; ſequentibus temporibus lingua ruberrima evaſit: ſomnus prioribus quatuor diebus nullus, aut ſaltem continuo interruptus, cum convulſionibus & delirio; quinto die acceſſit ſomnolentia, rubedo minus intendebatur, accedente inani alvum deponendi perpetuo conatu: decrevit febrilis impetus: labia autem oris torrida, fractaque inciſuris, quibus poſteris diebus febris magis decrevit, incolumes evaſerunt decimo die, ſequente totius cutis deſquammatione: verum in aliis aucta febris quinto die ſuſcitavit deliria, convulſiones, quibus octavo die moriebantur: Lethalis fuit hic morbus nonnullis.

Inclinatio acus maxima fuit, 70° 35′. Minima 69° 25′ Declinatio maxima 13° 8′. Minima 12°.

Junio fuerunt dies calidiſſimi, quibus ſimiles reliquo anni decurſu non fuerunt, uti 19, 20, & 21, hiſce enim diebus Thermometrum meridie oſtendit gradus 86, 90, 92. Noctes tamen aliquæ hujus menſis fuerunt frigidiſſimæ, quibus gelavit, ut 9, 10, 11, 12 contigit diebus. Quam funeſtis luctatus fuit hic annus cum Variolis! Menſe hoc inceperunt, diſcretæ, mitiſſimi generis, ut poſtea tanto lugubriorem Tragoediam luderent; quæ nunc dabantur, accuſari non poſſunt, nihilque inſoliti præſtabant. Poſt medium hujus menſis Synochi putres dabantur, oriundæ procul dubio a magnis viciſſitudinibus caloris frigoriſque, cum enim prioribus noctibus gelaverat, interdiu à maximo calore corpora admodum relaxabantur, hinc febres acutæ, dominantes tamen potius in vulgus, negligentiorem ſui corporis curam gerens, quam in temperatos cives.

Inclinatio acus maxima fuit 71° 15′. Minima 70° 25′. Declinatio maxima 13° 45′. Minima 12° 17′.

Julio pauci obſervabantur morbi, Variolæ tamen manſerunt, virium incrementum capientes, atque ideo hinc inde lethales: vidi florentis ætatis virginem cum confluentibus luctantem variolis, tanto ſanguinis impetu laboraſſe, ut menſtrua copioſa quarto die prodierint, extraordinario tempore, quibuſcum die ſextâ periit. Erat hic menſis ficciſſimus, totus aër arebat, exſiccans plantas & animalia, hinc faucibus exſiccatis oriebantur hinc inde anginæ inflammatoriæ, quæ magis increbuiſſent, niſi 27 & 28 die benignum Numen pluviam è cœli dimiſiſſet, aquâ refecta fuerunt Vegetabilia & cuncta animantia.

Inclinatio acus maxima fuit 72° gradium, minima 71° 30′. Declinatio maxima 12° 55′, & minima 12° 28′.

Auguſto frequentia mugiebant tonitrua, delapſaque copioſa fuit pluvia. Miteſcere parum, doloſæ adeo, videbantur Variolæ, plurimos quidem invaſerunt, ſed diſcretæ erant fere omnes, vix iis correpti ægrotabant, nullaque exigebant Variolæ remedia, ſicque feliciſſime curabantur.

In Scenam quoque prodibant Febres Tertianæ intermittentes, veluti Autumno fieri ſolet, ſed æque benignæ ac Vernales fuerunt, feliciter profligabantur aut amaris antifebrilibus, aut ſalibus Lixivioſis, vel Ammoniaco, raro ultra ſextum paroxyſmum durantes.

Inclinatio acus maxima fuit 72° 3′. Minima 71° 0′. Declinatio maxima 13° 36′. Minima 12° 25′.

Septembris vigeſimo ſexto, inter horam 5 & 6 veſpertinam magna corona circa Solem conſpecta fuit; eam tamen ipſe non vidi; quoniam narrationibus indoctorum non multum fidi poteſt, maluis ab hujus coronæ deſcriptione abſtinere.

Interim Tertianæ intermittentes increbuerunt, prioribus maligniores, adeo ut primis tribus quatuorve diebus, Autumnalium more, febres continuas æmularentur; ubi deferbuerat primus æſtus, ſe aut ſimplices aut duplices Tertianas eſſe probabant, quæ fortioribus remediis, quam illæ menſis Auguſti, erant ſuperandæ: reſiſtere non potuerunt Vomitorio & Salibus, aut Peruviano Cortici. Ardentes acutiſſimæque etiam inſurrexerunt febres, conjicientes ægrotos in magnum diſcrimen, nulloſque, niſi vi ex Orci faucibus ereptos relinquentes, plurimos trucidantes: puellam ſex circiter annorum viſitavi, quæ tam ardenti febre laborabat, ut tertio ab invaſione die non modo deliraverit, ſed ſanguinem ex ore, naribus, ano, pudendis copioſe depoſuerit, et intra diem quartum, miſeris convulſionibus tentata, animam efflaverit.

Jam Variolæ vires ſumpſerant, et plerumque erant confluentes, octavo et nono die enecantes plurimos, fœdamque edentes inter infantes, adultoſque ſtragem: nondum tamen ad ſummum malignitatis faſtigium increverant quemadmodum ſequentibus menſibus.

Inclinatio acus maxima fuit 72° 30′. Minima 71° 45′. Declinatio maxima 13° 40′. Minima 13° 11′.

Per totum *Octobrem* anginæ fuerunt, magis aquoſæ mucoſæve, quam Inflammatoriæ, cum vix febris, aut exigua modo eas comitabatur, amygdalæ inprimis tumebant, propendente quoque Uvulâ: curabantur

ſatis

ſatis facile fortiori alvi purgatione, atque calefaciente emplaſtro, faucibus circumpoſito.

Dyſenteria hinc inde dabatur, nequaquam lethifera, & ſolâ radicis Hypecacoannæ doſi feliciter curata.

Tertianæ ſive ſimplices, ſive duplices, nec erant copioſæ, nec pertinaces, ſeptem periodis plerumque terminatæ, levioribuſque remediis obedientes.

Quot non circa finem *Octobris*, poſt diem 26 Coryza afficiebantur? Magna profecto civitatis pars: nec febris aberat propter inſignem Schneiderianæ membranæ inflammationem, cauſam accuſabant omnes frigus nocturnum vigeſimi ſexti, quo gelu ſævierat notabile.

Verum Variolæ præcipua morborum pars ah quam parvæ, quam confluentes, quam malignæ, quam lethales erant! Strages edebant in civitate dolendas. Qui evaſerunt, quam deturpatâ fœdati facie, perpetua peſſimæ hujus luis geſtare debuerunt toto vitæ curriculo ſigna.

Vigeſimi primi veſpera Auroram Borealem, ſed exiguam notavi, in qua nihil inſolitum: in ipſo ſeptentrione ex nube arcuata, parum ſupra horizontem elevata lucidæ, uti fieri ſolet, ſurgebant columnæ, nec alte adſcendentes, nec multum fulgentes, ceſſavit totum phænomenon intra horam, incepit $7\frac{1}{4}$ veſpertinâ. In litteris curſoriis proditum eſt, eodem die in Italia Auroram Borealem fulſiſſe.

Maxima acus Inclinatio fuit 72° 30′. Minima 70° 45′. Declinatio maxima fuit 13° 48′. Minima 13° 20′.

Novembris decimo ſexto ſplendidiſſima emicuit, cui nullam parem vidi, Aurora Boreâlis; ſive magnitudinem, ſive fulgorem, ſive miros apparitionum diverſiſſimarum

fiſſimarum luſus conſiderem: quamobrem paulo prolixius eam a me obſervatam exponam: Maxima fuit hæc Aurora, obſervata in plurimis Hollandiæ urbibus, Leidæ à Cl. Zumbachio, Rotterodami ab Anonymo, hic deſcriptionem inſeruit Litterariis Diariis hujus anni, alter in Diſſertatione Phænomenon explicuit. Spectata quoque fuit Berolini a Cl. Kirchio, ejuſque obſervationibus Aſtronomicis inſerta. Circa horam veſpertinam octavam Phænomenon detexi; tum occupabat plagam Cœli Boream, Orientalem, Auſtralem; ſola Occidentalis tum immunis erat. Cœlum erat ſerenum, verum alba & opaca nubes 15 alta gradus ſupra horizontem incipiebat a Borea, extenta abhinc ultra Ortum, verum obliquo in horizontem terminata margine, ita ut inter Ortum & Auſtrum infra eum deſcenderit. Hæc Nubes ejaculabatur albas, lucentes, non tamen admodum claras, virgas: quarum aliquæ ad Zenith directe ferebantur, aliæ oblique: aliquando ſibi in Zenith occurrebant, quæ ex varia adſcenderunt plaga, tum vorticali actæ motu in gyrum, petebant Auſtrum, Occaſum, aliamve inter hos mediam plagam, prolapſæ quaſi verſus horizontem: ſæpius hoc ab aliis in Auroris Borealibus contigiſſe traditum eſt. Jam vero in plaga Orientali ingens & minax ſtabat perpendiculariter ad horizontem erecta columna ignea; hæc ſex lata gradus, 45 alta videbatur. Magna ejuſmodi moles non tam fugax, ac leviores radii, breviſſimæ plerumque durationis: hæc plurium minutorum ſpatio immutata perſtabat figurâ & magnitudine; lento tamen motu verſus Auſtrum ferebatur, elapſoque horæ quadrante è conſpectu evanuit: Eodem tempore in Auſtrali cœli plaga, ſub altitudine circiter 24 graduum, duæ jacebant ardentes columnæ, horizonti parallelæ,

parallelæ, magnæ, latæ, in longitudinem exporrectæ, quarum una extremitas ſpectabat ortum, altera occaſum: ita trium Minutorum ſpatio ſpectabantur, tum lente ad ſe accedebant, miſcebantur ambæ in unam, deinde duobus elapſis minutis penitus evanuerunt, nullum ſui veſtigium relinquentes, cœlo ibidem loci manente ſereno. Verum pulcherrima phænomena viſebantur horâ 9 ½. Quippe latiſſima columna perpendiculariter ſupra horizontem aſſurgebat, in parte cœli a Borea 20 gradibus verſus ortum, hæc candentis ferri inſtar rubebat, denſior aliis albentibus virgis, vix enim primæ magnitudinis ſtellam per eam ſpectare potui; renovata fuit hæc ſæpius, ita ut cum ejuſmodi columna 5 vel 6 minutis fulgebat, quia nova ſurgebat continuo, ultra horam duraverit: eodem tempore ex ipſa ſeptentrionali plaga aſſurgebat Zenith verſus, lucis albiſſimæ multum fulgentis Virga, ubi nubi adhærebat clariſſima, obſcurior quo altius adſcenderat, hujus latitudo multo minor priori: promovebatur lente a Borea per ortum, verſus Auſtrum, ſitu ſibi parallelo. Hora decima undique cœlum ardebat, certabantque de clariori fulgore inter ſe quatuor mundi plagæ: nunc enim quæ ſiluerat huc uſque cœli pars, Boream & Occaſum inter, evomebat vario tempore plurimos lucidiſſimoſque radios, delatos partim verſus Zenith, partim obliquo ſitu in horizontem a ſeptentrione verſus occaſum; momento poſt inſurgente vento jucundiſſimum dabatur ſpectaculum, cui ſimile nec antea nec poſtea vidi unquam: Auroræ Borealis materia hæſerat huc uſque ſupra eum aëris tractum, in quo regnabat ventus Euro-boreus: adſcendens parumper ventus, lambebat inferiorem Borealis Auroræ partem, abrumpenſque portiones hinc inde, effecit, ut interruptis

ruptis coruſcationibus, in undarum trementium modum, celerrime promotis cœlum fulgeret: in plaga Orientali ultra horam hoc contemplatus fui, non quod ſemper aderat, ſed nunc videbatur, per duo triave minuta ſilebat, renovatum mox, atque interruptis micabat vicibus. Utinam omnia, quæ ſimul aderant phænomena notare potuiſſem! Verum centum oculi ſat negotii ad id habuiſſent, totidem ſimul dabantur, cumque ad unam plagam direxeram aciem, multa interim in averſa parte contingebant. Poſt horam decimam in plaga cœli Occidentali uſque ad ſeptentrionem tres nubium atrarum ſeries, diverſæ altitudinis, ſupra ſe poſitæ, oriebantur. Infima erat arcuata, cruribus horizontem verſus inclinatis; aliæ binæ ſeries, diſtinctæ a ſe mutuo, rectis finibus, horizonti parallelis deſcriptæ erant: ex his quaſi pectinatim emittebantur breves, vixque lucentes radii, hinc inde nonnunquam fulgentior exibat, multo longior, quam juraſſes fumum fuiſſe lucidum ex camino magno cum impetu propulſum. Hora undecima cœlum adhuc ab omni parte micabat, potiſſimum plaga Auſtralis, non quod ex Auſtro columnæ aſſurgebant verſus Zenith, ſed a Zenith verſus horizontem deprimebantur, agitatæ nempe per ventum Borealem a ſeptentrione per Zenith verſus Auſtrum: increverat jam ventus ad impetus gradum ſecundum, quo lente minui ſpectacula videbantur, non adeo frequentes generabantur columnæ, brevioris erant conſtantiæ, citius provolvebantur, donec hora duodecima cœlum nubibus incepit obduci, brevi poſt iterum ſerenum, aſt multo minus fulgens quam antea: hora tandem ſecunda poſt mediam noctem omnia ceſſaverunt, ſuperſtitibus partim nubibus denſi-

denſioribus, partim albis, hærentibuſque in plaga Occidentali, Borea, & Orientali, ad altitudinem circiter 45 graduum ab horizonte, reliquo cœlo manente ſereno : vigente hoc ſpectaculo adeo lucebat cœlum, ut litteras majores diſtinguere potuerim, fere æque facile ac nocte ſerena fulgente luna, nondum plena : cum totum ardebat cœlum, nullibi umbræ ab ædibus projectæ : Contigit hoc Boreale lumen poſt Ventum Auſtralem impetuoſiſſimum, qui noctu præcedente ſævierat.

Animadverti hoc menſe nonnullos Rheumatiſmos, qui vulgaribus ſtipati ſymptomatibus, aliquando auſcultabant remediis, interdum tamen e medio tollebant decumbentes, morboſâ materiâ raptâ in Cerebro, aut in Inteſtinis: Pleuritis quoque adfuit, ſed benignæ indolis, & repetita Venæ ſectione, refrigerantibus diluentibus auxiliis ſatis facile profligata : Verum cum horrore Variolarum reminiſco, quæ adeo peſtilentes & malignæ, ut nunquam forte ullibi terrarum pejores, nulla fere ab iis intacta domus in hac civitate : Solent menſis *Novembris* ſingula ſeptimana efferri 20, aut ad ſummum 25 ad funera : ſed quot nunc efferebantur à Variolis proſtrata! prima ſeptimana numerata ſunt 65 : altera dabantur 74, tertia 69, quarta Septimana 59. Quo tempore peſtis in hac urbe maxime ſæviit, tradentibus annalibus tot homines qualibet ſeptimana diem ſuum non obiverunt. Variolæ proſtraverunt aliquos quarto, quintove die à primâ invaſione : alios octavo, undecimo, decimo quarto, decimo ſexto, imo poſt menſem, cum nempe tabe computruerant corpora. Qui evaſerunt, Orci faucibus proximi fuerunt omnes : perierunt ſubito nonnunquam, quibus Variolæ benignæ optimiſque cum ſignis : incolumes evaſerunt alii, quibus omnia

peſſima, & gangræna correpta videbantur: nemo jam vitæ alicujus ægrotantis fidebat, eludentibus perpetuo vel prudentiſſimos Medicos hiſce Variolis. Spes quidem aliquando magna, ſed præſagium certum dabatur nullum: Vidi & tractavi, quibus poſt decimum quartum diem novæ recrudeſcebant Variolæ, ſatis copioſæ, in facie & reliquo corpore, quæ vigeſimo ſecundo die tantum ſuppuratæ erant, ægro tamen ſuperſtite: Quoties non vidi Linguam, palatum, fauces gingivas adeo variolis obſeſſas, ut ne quidem locum, ſinapeos grano æqualem, liberumque inveniſſes! ſed hi omnes perierunt: Vidi per plurimos dies depoſitas albas fæces, pure pleniſſimas, adeo ut totus inteſtinalis ductus, non niſi Variolarum armamentarium fuerit, ipſeque Cholidochus ductus ab iis obſeſſus, clauſuſque, aliqui horum perierunt, alij in priſtinam ſanitatem reconvaluerunt: plurimorum ægrotantium accuratiſſimas conſcripſi hiſtorias, ut ipſe mirum morbi genium addiſcerem; ſed prolixiores ſunt, quam ut his Ephemeridibus inſerantur. Utinam quis adeo beatus, qui huic contagio ſpecificum inveniſſet remedium: poſtquam varia tentaveram, animadverti, feliciores fuiſſe ægrotos, qui ſibi relicti manus medicas reſpuerant; hinc qui nihil agendo Medicinam exercebat, plurimos ſervabat. Nonnulli ægrotos infuſo fœcum ovinarum officioſiſſime necabant; alij ſpiritubus acidis, uti Nitri, illove dulcificato, vel Oleo Vitrioli, Ptiſanis, &c. nequaquam feliciores: æque nocebant calefacientia, ſudorifera, quam diluentia, refrigerantia: Venæ ſectio primis diebus ante eruptionem puſtularum, fere certo lethalis: pudet pigetque plura de hoc morbo, cruce & infamia medicorum, commemorare.

Inclinatio

Inclinatio acus maxima fuit 72 graduum, minima 70° 35′. Declinatio maxima 13° 28′. Minima 13 grad.

Decembris fuit admodum pluvioſus, nec memini quatuor annorum ſpatio, quibus obſervationibus hujuſmodi ſollicite operam impendi, tantam pluviæ copiam ſtillaviſſe, quæ fuit 4 $\frac{1}{2}$ pollicum. Baroſcopium ſexto die humilius concluſit Mercurium, quam unquam intra 4 annos fuit ſcil. ad 27 poll. cum 10 lineis.

Variolæ adhuc dominari pergebant, uti ſuperiori menſe, minus tamen lethales, quoniam ſubjectorum, in quos ſævire poterant, parcior copia. Circa medium *Decembris* aliquæ repullulabant Tertianæ, ſed exquiſitæ, benignæ; quemadmodum etiam Pleuritis fuit, paucos interimens cives, neque ullis ultra ſolitum ſtipata ſymptomatibus.

Inclinatio maxima acus hoc menſe fuit 72° 48′. Minima 71° 10′. Declinatio maxima 13° 21′. Minima 13° 13′.

Tota quantitas pluviæ hoc anno delapſæ altitudinem perpendicularem habuit 25 poll. 1 $\frac{1}{4}$ linear. Rhenol. Quantitas aquæ, quæ in vaporem abiit ex vaſe aperto & ſupra deſcripto fuit æqualis 32 poll. 2 $\frac{3}{4}$ linear. Rhenol. Rogat quis merito, majorne aquæ copia in auras adſcendat, quam relabatur, ubinam hæc maneat? Conſideret hic, ex Aquâ quidem a nobis obſervatam adſcendere copiam, non vero ex Terra, in quam tamen relabitur pluvia, ſi proinde copia pluviæ in his regionibus deciduæ, originem quoque in ipſis habuiſſet, & tanta Terræ quam Aquæ ſuperficies fuerit, fere duplo major Aquæ copia in auras ſub vaporum forma adſcendat neceſſe eſt, quam ſub pluviæ ſpecie relabi videtur. In his terris non ſolum id ob-

tinet ut plus aquæ evaporet, quam pluit: idem, enim notante Cl. de la Hirio in Academiæ regiæ Pariſinæ Monumentis Anno 1703, in Gallia obſervatur.

Quicunque obſervationes Magneticas intuetur, non poteſt non admirari viciſſitudines Inclinationis & Declinationis, quibus quotidie acus Magneticæ ſubjiciuntur in eodem Terræ loco: hinc nunquam poterit nauta ex Declinatione acus ante aliquod tempus cognita, concludere ſe eſſe in eodem loco, cum eandem Declinationem obſervat: Quam irregulares vero ſunt mutationes? Nequaquam cum Atmoſpheræ mutationibus, ſive ejus calorem, pondus, motum ſpectes, conſentiunt: quamobrem cauſa, quæ dirigit Magnetem in ipſo Terræ gremio, non ſupra ipſam, quærenda erit: hæc neceſſario perpetuis ſubjecta erit motionibus, quibus acus chalybeæ in ſuperficie Terræ obediunt. Examinatis totius anni obſervationibus dubitavi, an quidem unquam mortales eo uſque Magneticam doctrinam promoturi ſint, ut declinationes certis regulis adſtringere queant, eaſque ad ſtata tempora prædicere pro qualibet Terræ regione: Nihilominus nec inutile, nec injucundum erit ejuſmodi obſervationes colligere, quia caſu aliquando plus indicabunt de cauſa, quam ſperare poſſemus.

Cætera ſequentur.

III. *A Diſcourſe concerning the* Difficulty of curing Fluxes, *writ occaſionally on reading Dr.* de Juſſieu's Memoire *in the Hiſtory, &c. of the Royal Academy of Sciences in* Paris, *for the Year* 1729. *By* William Cockburn, *M. D. F. R. S. and of the College of Phyſicians,* London.

IN reading Dr. *de Juſſieu*'s Memoire, about the preſent Diſgrace of *Ipecacuanha* in *France*, and the Method he propoſes for redreſſing its Defects by *Simarouba*, a Root brought from *Cayen* in *America*, I was ſurpriz'd to find a Remedy almoſt ador'd for half a Century, to have fallen into the utmoſt Contempt; a *Specifick*, a very ſhort and ſatisfactory Word, totally neglected by its moſt zealous Votaries.

The learned Profeſſor alledges, that this great Revolution, in the Fame of *Ipecacuanha*, proceeds from its having been unſkilfully adminiſtred: Phyſicians commonly conſidering the general Appearance of a Looſeneſs only, without penetrating into the particular Cauſes which ſupport it, and that require, on that Account, different Methods of curing it.

Monſ. *de Juſſieu*, avoiding all Extremes, is an Enemy to the baniſhing *Ipecacuanha* altogether out of the Practice of Phyſick, as many of its diſappointed Adorers now do; becauſe it is not the infallible Specifick they vainly imagined it to be.

This common Miſapplication of Medicines, or our Ignorance of the particular Circumſtances of a Diſeaſe, when it requires a different Method of Cure, is the very Reaſon why great Numbers of excellent Medi-

cines,

cines, among ancient Phyſicians, have been loſt, becauſe they were not underſtood. Take a broken Shin only, which has the Skin only rubb'd off, obſerve the Difficulty the beſt and honeſteſt Surgeons have to cure it. Go to *Aetius*, and others, where you may find a *ſafe*, *eaſy* and *ſpeedy* Cure; which, as the ſame Author on another Occaſion obſerves, the People make Slight of, becauſe they do not know the Danger or Trouble that often attend it.

A *Looſeneſs* is more liable to be miſtaken than the greateſt Number of other Diſeaſes; becauſe it is produced by two immediate Cauſes that are very different, when the reſt have one Cauſe only, however great the Diverſity of particular Caſes may appear to be.

A Fever, *viz.* has but one Cauſe, tho' the Variety of Fevers, or the various Appearances of a Fever are infinite, and never can be claſs'd by Obſervation, I ſhall therefore conſider the different Circumſtances of a Looſeneſs obſerved by Dr. *de Juſſieu*, and that occaſion the Miſapplication of *Ipecacuanha*; but I ſhall afterwards endeavour to make his Account more perfect; for thereby Phyſicians will be able to have more perfect *Intentions* and Views of Curing than hitherto they have had.

When great Crudities, ſays the Doctor, *and indigeſted Stuff in the firſt Paſſages, or an Obſtruction in the Bowels of the lower Belly are the Cauſe of a Looſeneſs, we may always expect the common good Effects of the* Ipecacuanha *for a Cure.*

On the contrary, when Ipecacuanha *is given againſt an Hepatick Dyſentery, or againſt a great Diſcharge of Blood upwards or downwards, often occaſioned by a purging Medicine that was given for*

a Cure

a Cure of the Looſeneſs, no Succeſs can reaſonably be expected from the Specifick, far leſs have we any Hopes, when Ipecacuanha *is given for the Cure of a Looſeneſs that ſubſiſts on an Inflammation of the lower Belly; or when ſharp and fix'd Pains give us a Suſpicion that the Dyſentery has a cancerous Ulcer for its Cauſe.*

As there is no Difficulty that is peculiar to a *Dyſentery*, and is not common with the Dangers of a Diarrhœa, the Terrour of Blood not excepted, it muſt be acknowledged that any *Vomit* as well as *Ipecacuanha*, is a proper Cure againſt Indigeſtions and Crudities in the Stomach, as *Hippocrates* anciently obſerved, and has been believed by all Phyſicians ſince his Time: So that there is nothing in the *French* Specifick that is not in *Salt* of *Vitriol*; which we find held its Reputation, in curing *Dyſenteries*, longer than *Ipecacuanha* is like to do.

It is more wonderful that this Way of Curing a Looſeneſs by *Ipecacuanha* was not ſooner determined. Nothing beſides the lazy Talk of a Specifick, that excludes all Reaſoning and Reflection, could have made Men eaſy under ſo groſs Ignorance. The very Inſtance given us by the late excellent Dr. *Tournefort*, in the Caſe of his Tutor *Petrus Sylvanus*, is a ſufficient Proof that *Ipecacuanha* is no Charm of a Specifick, but that it cures by its Evacuating: For, when the Weakneſs of *Sylvanus* made them cautious in adminiſtring the Specifick, the Diſeaſe held its Ground againſt the Charm, and its Adorers, 'till Deſpair drove the Phyſician upon larger Doſes, the laſt Reſort of the Vanquiſhed, and they produced Evacuations by *Vomit* and *Stool*, and thereby his *Health* in one Night

It would be ſuperfluous to obſerve upon what is ſaid about the *Simarouba*, and how far it may remedy the Defects of *Ipecacuanha*, the Trials of it being few, not ſufficient to determine the Univerſality of its Uſe. Far leſs ſhall I enquire, whether the *Weſt-India* Plant has any relation to the *Macir* from the *Eaſt-Indies*, mentioned by *Pliny* *; though I wiſh Dr. *de Juſſieu* had prepared the *Simarouba* with *Honey*, ſince the great Cures, recorded by *Pliny*, by the *Macir* might be aſſiſted by its being prepared in that Way.

I ſhall then proceed, and make the foregoing Account more perfect, and more obvious, better fitted to fix the Views of Phyſicians, in the Point they are to purſue. For this Purpoſe, I ſhall give a plain Account of the ſeveral Species of a Looſeneſs, and in each of them apply the different Kind of Remedies employ'd for the Cure of them. Thus we ſhall perceive the proper Adminiſtration for every Looſeneſs, and how far any of them is left without a Cure.

The Anatomy of the Guts alone, informs us, that the *immediate Cauſe of every Looſeneſs*, whether it be Symptomatick or Eſſential, muſt either be a *quicker Conveyance of the common Quantity of concocted Food, and of the Liquors that are commonly mixed with it in the Guts. Or the Cauſe of a Looſeneſs is a greater Secretion than ordinary, of a watry Subſtance from the Blood into the Guts, and brought into them by the* Pancreas, *and various other* Glands. *In both which Caſes there muſt needs be a larger Diſcharge of liquid Excrements, by Stool, than uſual, or there muſt be a Looſeneſs.*

A Looſeneſs produced by the firſt of theſe Cauſes, admits of great Variety; both on the Account of the different

* Hiſt. Natur. lib. xii.

different *Stimuli*, and even from the different Degrees of the *Stimulus* in each of them. The *Stimulus*, *viz.* of indigeſted Food, Fruits, and the like, differs very much from the *Stimulus* of *Gall*. The firſt Sort is confined to the *Stomach* and *Inteſtines*: In which Caſe, the Diſeaſe is often a Cure to it ſelf; whereas the *Stimulus* of Gall is greater, and the Cauſe is more permanent and ſeldom carries off it ſelf. The Degree of the *Stimulus* may be determined by ſome other concomitant Symptoms of *Slime*, *Glaire*, *&c.* But when the *Stimulus* is occaſioned by the *Piles*, an *Ulcer*, or a *Stricture* in the Guts, it is vaſtly more Violent, and much departs from the common Cure of a Looſeneſs, whereby Phyſicians are often ſubjected to fatal Errors, and groſs Miſapplications of their Medicines.

The *Watry Looſeneſs* produced by the other immediate Cauſe, is indeed deplorable; becauſe a Method of Curing it is not commonly known. It is not only as a Principal, but it is a Second, in the Beginning, at the Ending, and in the intermediate Times of all other Diſeaſes, and even in old Age, when Nature is ſubmitting to the Power of Death; when Phyſicians call it a Colliquative Looſeneſs, becauſe it ſeems to melt away the Fleſh of the Sick. * *Petrus Salius Diverſus*, a moſt approved Phyſician, affirms it to be vain for a Phyſician to attempt the Cure of it. *Carolus Piſo*, who endeavours to explain it, and the moſt ſagacious *Laz. Riverius*, after trying all the common Methods, give us no better Hopes of a Cure.

It is now manifeſt why a Looſeneſs, that in all outward Appearance is one and the ſame thing, and promiſes to ſubmit to the ſame Remedy, is vaſtly different

* Pag. 188, 189. lib. de Peſte.

in the manner of Curing it. Our Experience has contradicted our Belief, and the Remedy that has proved Effectual and Sufficient in one Caſe, has proved Ineffectual and Uſeleſs on other Occaſions; on which Account Remedies are very liable to be miſapplied.

To prevent this Misfortune in a great Meaſure for the Future, I ſhall conſider the Medicines commonly made uſe of by Phyſicians for the Cure of a Looſeneſs; and next, how they may moſt properly be adapted to that End: For thus we muſt perceive the particular Caſes wherein they are like to be uſeful, and when they are not like to be of any uſe at all.

Aſtringents, or binding Medicines, were the firſt employed for the Cure of a Looſeneſs, as well as of every other Evacuation: But *Hippocrates* obſerving that a Looſeneſs was often the eaſieſt cured when it was attended with Vomiting, *Vomiting* Medicines were introduced on that Account. On a like Conſideration, Purging Medicines were admitted by *Celſus*, becauſe he found the *Purging* the *Cure* of itſelf; or that the Looſeneſs went off by going to Stool for a few Days: But he adviſes Phyſicians to take care that the Looſeneſs does not run longer than ſeven Days, and that it is not attended with a *Fever*; for in that caſe the Looſeneſs is not *Critical* and *Salutary*, but *Symptomatical*, and haſtens on the Ruin of the Sick. All theſe Obſervations have not been found univerſally true in many other Countries; for *Cœlius Aurelianus*, a moſt accurate Obſerver of Diſeaſes, *Rhaza* and *Avicenna* blame this free Uſe of Purging and Vomiting, and may be juſtified by what will be ſhewn in the Progreſs of this Diſcourſe.

But,

But, now that we may apply this Artillery of Phyſicians againſt the two general Cauſes of all Looſeneſſes, we ſhall begin with the moſt ancient of the mentioned Methods, which was practiſed by *Prodicus Selymbrianus*, whoſe School was adorned by the divine *Hippocrates*.

Binding Medicines, as I lately obſerved, were employed for the Cure of every Evacuation, and are ſtill the Refuge of Phyſicians when all other Methods have been baffled, under their own Conduct and Direction; they tacitly have the Preference given them to all other Medicines; for Inſtance, *Ipecacuanha* is preferr'd to any other Vomit, and *Rhubarb* to any other Purge, becauſe they are more *aſtringent* than any other of the Tribe. So far do Phyſicians extol the Power of *Aſtringents*, that many of them affirm, that by them any *Looſeneſs* may be repreſs'd, if they did not think it unſeaſonable or improper.

However, it may ſtand with theſe Boaſters, it is very certain, that theſe Medicines only affect a Looſeneſs occaſioned by a *Stimulus*, and if this is ſmall, the Looſeneſs may be cured by it; but if the Degree of the *Stimulus* is greater, the aſtringent Medicine is either not able to put a Stop to it, or it will tear the Sick with Gripes if it does.

It is on the ſame Account of the *Stimulus*, that a *Vomit* or a *Purge* is properly premiſed to other Medicines, if it conſiſts with the Strength of the Sick; but after all, the Store-houſe of Phyſicians ſeems to be exhauſted in curing a Looſeneſs that proceeds from Indigeſtion, or Gall; but if the *Stimulus* is from the *Piles*, an *Ulcer*, or a *Stricture* in the *Guts*, Phyſicians are loſt without any Remedy, and too frequent-

ly have recourſe to the Omnipotent Aſtringent, without any Succeſs. Here is a real Want, an Inability and Unskilfulneſs in our Work, and leaves too much room for miſapplying Medicines.

But if we turn theſe Engines of Vomiting, Purging and Binding, upon the other general Cauſe of a Looſeneſs, they either fall very ſhort, or like a little Water thrown upon a great Fire, they rather inflame than extinguiſh it. *Hippocrates* * indeed does not mention the *Watry Looſeneſs*, but he ſays many things that peculiarly concern it; which *Foeſius* not underſtanding, blamed him for Obſcurity in this Place. *Piſo* † gives a very plain Deſcription of this Looſeneſs, and his Obſervation is admitted by every ſucceeding Phyſician.

The deſperate State of the Watry Looſeneſs was formerly mentioned from the Confeſſion of Authors of the greateſt Knowledge and Veracity; and Phyſicians ſhall for ever find that Looſeneſs to become more violent the more you preſs it with Aſtringents, Vomits, or purging Medicines. The boaſted Omnipotency of putting a Stop to a Looſeneſs at Pleaſure, muſt ſerve another uſe with the Sick, though it may not be able to put the deſired Stop to his Purging.

There is even a Singularity in the Cure of this Looſeneſs which I think has not hitherto been obſerved. In every other Kind of Looſeneſs, the Stools acquire a Conſiſtence, when they begin to be cured; but in the Watry Looſeneſs, the Stools commonly leſſen in Quantity, though not in their Looſeneſs.

I ſhould ſay ſomething of *Opium*, a Medicine often made uſe of for the Cure of every Kind of Looſeneſs,

* Coac. Prænot. 134. Prædict. 81. † Sect. IV. cap. 1. Obſ. 54.

neſs, but as it neither acts as an Aſtringent, nor in a Way obſerved by Phyſicians, it muſt ſtill remain among other *Deſiderata*.

IV. *A Letter from Mr.* John Dove *to* Edmund Halley, *LL. D. F. R. S. and Reg. Aſtrom. at* Greenwich, *containing an Account of a* Comet *ſeen on* February 29, 173½.

From on Board the Monmouth, James Montgomery *Commander, in* Table-Bay, March 17, 173½.

SIR,

I Had the Honour to wait on the Governor the 8th of *February*, in Latitude 33° South, where he parted with us for St. *Hellena*.

The 29th of *February*, at about half an Hour paſt Ten at Night, I judge (having a good Obſervation at Noon) we were in Lat. 34° 28′ South, and Long. 12° 35′ Weſt from Cape *Bonne Eſperance*, the Moon ſhining very bright, being near the Full, we ſaw ſomething very bright riſe about Weſt, which I judge to be a Comet: It ſet about Eaſt, paſſing from Weſt to Eaſt in about five Minutes, between the Moon and our Zenith, and to the Southward of *Spica Virginis*; it carried a Stream of Light after it about

40°

40° long, and 1° or 1° ½ broad; the Brightneſs of the Moon outſhined the Comet as it came near it.

Pleaſe to excuſe the Trouble of this by the Way of *Holland*; but knowing your Curioſity in Aſtronomy, and viewing your Synopſis of the Aſtronomy of Comets, I thought it might be in ſome meaſure acceptable, though we had not Conveniency to take a very exact Obſervation of it. I am,

SIR,

Your moſt humble Servant,

JOHN DOVE.

P. S. Variation *per* Azimuth, *a. M.* about four or five Leagues Weſt from this Bay, by two Compaſſes, 16° 23′ Weſt; and by eight Obſervations in this Bay, Azimuths and Amplitudes, the Medium 15° 56′ Weſt.

V. *An Account of two Experiments of the* Friction *of* Pullies. *By the Reverend* J. T. Deſaguliers, *LL. D. F. R. S.*

AS the Experiment which I made on *Thurſday*, *January* 14, 173$\frac{0}{1}$, before the *Royal Society* (See *Philoſ. Tranſ.* N° 423.) did perfectly agree with

with my Theory of Friction, I was willing to try how the ſaid Theory would agree with ſuch a Tackle of Pullies as is commonly uſed in Building.

The firſt *Experiment* was made with a Tackle of five Braſs Sheevers in Iron Frames or Blocks; that is, three Sheevers in the upper Block, and two in the lower.

Having made an Æquilibrium, by hanging one Hundred and a quarter at the lower Block, and a quarter of an Hundred at the running Rope; I added 17 Pounds and a half before the Power could go down and raiſe the Weight.

Experiment 2. Two Hundred and an half being balanced by half an Hundred, the Addition of 28 Pounds made the Power raiſe the Weight.

N. B. The Sheevers were five Inches Diameter, the Pins half an Inch, and the Rope three quarters.

In the firſt Experiment 17 Pounds and an half exceeds by 4 Pounds and a half the Sum of the Frictions deduced from the Theory. But in the ſecond Experiment 28 Pounds exceeds the Sum of the Friction but one Pound.

The Reaſon of this appeared to be, that the Rope at firſt was too big for the Cheeks that held the Sheevers; but in the ſecond Experiment, where the Rope was more ſtretched, it was ſomewhat diminiſhed in Diameter, and ſo brought off from rubbing ſo hard againſt thoſe Cheeks.

From knowing the Quantity of Friction *à priori* in ſuch large Tackles, we may know what to expect in Practice: For if one Man, who for a ſmall time can exert the Force of one Hundred Pounds, thinks that

that he may draw up a Stone, or a Roll of Sheet-Lead, or any other ſuch Weight to the Top of an Houſe with a Tackle of Five (becauſe this would ſeem feaſible from mechanical Principles) will find himſelf miſtaken on account of the Friction, which will not be ſurmounted without an additional Force of fifty Pounds.

F I N I S.

E R R A T A.

PAG. 154. l. 24. and p. 356. l. penult. read, *They may be either of Metal, or Glaſs Plates foiled having their two Surfaces*, &c. Tranſact. Numb. 410. p. 142. l. 20. *perterriti.* P. 143. l. 15. *Ventriculo.* l. 18. *disjici.* P. 148. l. 3. *ſignificari.* l. 11. *Phanomeno.* P. 151. l. ult. *Lond. pro Leg.*

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PHILOSOPHICAL TRANSACTIONS.

For the Months of *November* and *December*, 1732.

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I. *Two*

I. *Two Letters from Mr.* Stephen Gray, *F. R. S. to* C. Mortimer, *M. D. Secr. R. S. containing farther Accounts of his* Experiments *concerning* Electricity.

LETTER I.

SIR,

ACCORDING to my Promiſe, I herein give an Account of what farther I have diſcover'd relating to Electrical Attraction, which I ſhould have done ſooner, but was willing to ſee what farther Improvement I could make to thoſe Experiments, at my Return to *London*, which were begun in the Country.

About the latter End of *Auguſt*, being at Mr. *Wheler*'s, after having repeated the Experiment of making Sulphur attract Leaf-Braſs *in vacuo*, Mr. *Wheler* having a very good Air-Pump of the larger Sort, made by Mr. *Hauksbee*, we ſuſpended from the Top of a Receiver, which was firſt exhauſted of Air, a white Thread that hung down to about the Middle of the ſame: Then the Receiver being well rubbed, the Thread was attracted by it vigorouſly. When it was at reſt, and hung perpendicular, the Tube was rubbed, and being held near the Receiver, the Thread was attracted towards that Side of it; if the Tube was removed ſlowly, the Thread returned to the Centre of the Receiver, but when moved ſwiftly, the Thread

was attracted by the oppoſite Side of the Receiver: If the Hand was held near the Receiver, and moved haſtily from it, the Thread was attracted by the oppoſite Side, as before. This ſeemed at firſt difficult to account for; but upon farther Conſideration, we concluded it proceeded from the Motion of the Air made by the Tube, and in the other Caſe by that of the Hand, which took off the Attraction from that Side, and not on the other Side; ſo that, as Mr. *Wheler* very well expreſſed it, by this Means the Balance of the Attraction was taken off.

We made another Experiment by ſuſpending a Thread on the Top of a ſmall Receiver, and whelming a large one over it; then by firſt rubbing this, and holding the rubb'd Tube near it, the Thread in the middle Receiver was attracted to that Side of it where the Tube was held.

An Experiment, ſhewing that Attraction *is communicated through* opacous *as well as* tranſparent *Bodies, not* in vacuo.

There was taken a large Hand-Bell, the Clapper being firſt taken out, and a Cork ſuſpended by a Thread from the Top of the Bell, the Cork being ſmeared over with Honey: Then the Bell was ſet on a Piece of Coach-Glaſs, which had been well rubbed, on which the Leaf-Braſs was laid; then the Tube being rubbed, and held near the Handle of the Bell, and afterwards near the Top and Side of the ſame, the Bell being taken off, there were ſeveral Pieces of the Leaf-Braſs ſticking to the honey'd Cork that had been attracted by it: It appeared alſo that ſome others of

of them had been attracted by the Bell, being removed from the Places they were left in when covered by it.

Some time after Mr. *Wheler* told me of an Experiment he had made *in vacuo*, when I was gone from him. He took a ſmall Receiver, and in it ſuſpended a Thread, and over this four other Receivers, all exhauſted, and the Thread was attracted through all the five Receivers, and he thought the Attraction was rather ſtronger than before, when a ſingle Receiver only was made uſe of; but inſtead of wet Leather, he made uſe of a Cement I had recommended to him, *viz.* Bees-Wax and Turpentine, which was what Mr. *Boyle* made uſe of in his Experiments with the Air-Pump, and that, as I had told him, it was my Opinion the Attractions would be much ſtronger, the Steams of the wet Leather taking off ſome of the attracting Force.

I ſhall now proceed to give ſome Account of the Experiments made at Mr. *Godfrey*'s; the firſt of which was giving an Attraction by the Tube to a Boy ſuſpended on Hair-Lines, and that by the Intervention of a Line of Communication, the attractive Vertue paſſes to another Boy that ſtands at ſeveral Feet diſtant from him. But before I go any farther, it may not be improper to give an Account of that Experiment of the attractive Power that is communicated to the Boy ſtanding on Roſin; which though the Society have ſeen the Experiment, I have not given you any Account of it in Writing.

June the 16th, 1731, in the Morning, I made the following Experiment on the Boy mentioned, cauſing him to become Attractive by ſuſpending

him on Hair-Lines. There was taken two Pieces of white Roſin made into round flat Cakes of ſomewhat more than eight Inches Diameter, and two Inches thick. Theſe were laid down on the Floor of my Chamber, ſo near together, that the Boy might ſtand with one Foot upon one, and the other upon the other Cake of Roſin: Then the Leaf-Braſs being laid under his Hands, the Tube rubb'd and held near his Legs, cauſed both his Hands to attract and repel the Leaf-Braſs to the Height of ſeveral Inches: Or if there was laid Leaf-Braſs under one Hand, and the Tube held near the other Hand, there was an Attraction communicated to the farther one; and when the Tube was applied either to his Hands or Feet, there was an Attraction given to his Cloaths; ſo that a Piece of white Thread being held by one End, the other End would be attracted at near the Diſtance of a Foot; ſo that the Attraction is altogether as ſtrong, if not ſtronger, than when the Boy was ſuſpended on Hair-Lines.

I come now to the above-mentioned Experiment: One of the Boys being ſuſpended on the Hair-Lines, and the other ſtanding upon the two Cakes of Roſin, the Boys holding Hands with each other, under the Boy's Hand that ſtood on the Roſin was laid the Leaf-Braſs; then the Tube being rubb'd, and held near the Boy's Feet that hung on the Hair-Lines, the Hand of the Boy that ſtood on the Roſin attracted ſtrongly. Then there was taken a four Foot Rule, and given to the Boys to hold by each End, and there was the ſame Vertue of Attraction given to the other Boy as before. After this a Line of Packthread was given them to take hold of by the Ends, and there was an Attraction

traction communicated from one End to the other, with as much Vigour as by any of the other Methods before mentioned. This Experiment was made *September* 13, 1732.

September 14 I firſt made the following Experiment. There was taken a Rod which was compoſed partly of Wood and partly Cane: It was twenty-four Feet in Length, and in Form not unlike two Fiſhing Rods ſuppoſed joined together at their bigger Ends. This Rod was ſuſpended Horizontal by two Threads of Silk: Over this, at about two Feet from the End, was ſuſpended a ſmall hazel Wand, about five Feet long, at right Angles to it, but not touching the Rod: Then going to the other End of the Rod, the Tube being excited and held near it, repeating the ſame three or four times as uſual, and going to the hazel Wand with a ſmall white Thread, I found that it was attracted to it when held near to any Part thereof. The next Day Mr. *Wheler* came to Mr. *Godfrey*'s, and now, by their Aſſiſtance, I repeated the Experiment, and we found that by ſuſpending the Wand at ſeveral Heights, we could perceive there was an Attraction, when it was at the Height of more than twelve Inches. I ſhall now give ſome Account of my repeating, and what farther Improvements I have made to ſome of theſe Experiments ſince my Return to *London*.

September 29th I repeated the Experiment on two Boys, firſt ſetting one of them on Cakes of Roſin, and the other being ſuſpended on the Hair-Lines, and the Effect was the ſame as hath been above related. I then cauſed both the Boys to ſtand on Cakes of Roſin, giving them to hold a Part of a *Spaniſh* Cane-

Fiſhing-

Fiſhing-Rod that was eight Foot long, one Boy holding one, and the other Boy the other End of the Rod; then the Leaf-Braſs being laid on the Stand, and one of the Boys holding his Hand over it; I went to the other Boy, and the excited Tube being held near the Palm of his Hand, the firſt Boy's Hand attracted and repelled the Leaf-Braſs ſtrongly. Then there was a Piece of Packthread given them to hold by each End, about the ſame Length with the Rod, *viz.* eight Feet long. Under each of their Hands was laid Leaf-Braſs; then going to the middle of the Line, holding the Tube near it, the farther Hand of both the Boys attracted the Leaf-Braſs with ſo much Vigour, that it is not to be doubted that had the Line been much longer, they would have attracted at a far greater Diſtance. I then cauſed the Boys to ſtand on the Cakes of Roſin, ſo as to let the Flaps of their Coats touch, and then by holding the Tube to one of their Hands, the other Hand attracted, but not with more Force than when they were diſtant the Length of the Line. Then they ſtood ſo much farther as not to let their Coats touch by about an Inch, and then exciting one of them to attract, the other received not the leaſt Degree of Attraction. I then bid one Boy put his Finger upon the other Boy's Wriſt, and then he immediately became Electrical.

October the 4th I made the following Experiment: A Fiſhing-Rod of about ten Feet eight Inches long, being horizontal, and over it, towards the leſſer End, a ſmall Rod, being the Top End of another Fiſhing Rod, at the leſſer End, which was Whale-Bone, there was put on a Ball of Cork two Inches Diameter,

the

the ſmall Rod touching the great one; then the Tube being excited, and held near the great End of the great Rod, applying it as uſual; then going to the Cork with a pendulous Thread, I found it attracted it at the Diſtance of at leaſt two Inches. Then the Rod was moved higher, ſo as not to touch the End of the long Rod, by Eſtimation about an Inch, and after ſeveral Trials, there was a viſible Attraction, when the little Rod that carried the Ball was above the great one thirty-four Inches.

October the 5th, I took a Line of Packthread ſeventeen Feet four Inches long, with ſilk Lines tied to the Ends of the Packthread, one of them about four the other two Feet long, near two of the oppoſite Corners of my Chamber, where in each of them was drove a Hook at about three Foot and a half high, to which the Ends of the Silk were faſtened, drawn ſo tight as to bear the Packthread nearly Horizontal: Then the ſmall Part of the Fiſhing-Rod was ſuſpended over the Packthread at about four Feet from the End; then the Tube being applied to the other End of the Packthread, the Cork Ball at the End of the little Rod was attractive, and at ſeveral Removes, to the Height of forty-ſeven Inches, there was a viſible Attraction of the pendulous Thread.

October the 6th, inſtead of the ſmall Rod, I took a Packthread about four Feet long, and having tied ſilk Threads to each End, by which the Thread was ſuſpended over the longer Line Horizontal, and at right Angles nearly to the ſaid Line, which was by tying the Ends to perpendicular Lines of Packthread that were faſtened to Hooks at each End, and had ſliding Knots on them, ſo that the croſs Line might be moved

moved higher or lower as there was Occaſion for it; upon one End of this Line I put a Ball of Cork, and found, that when the firſt Line had been excited the Vertue was carried up to the ſecond Line, and cauſed the Cork Ball to attract. I then took off the Cork Ball, and put one of Ivory in its Place, and this attracted after the ſame manner; and afterwards I hung two Ivory Balls, one at one End, and the other at the other End of the Line, and found there was a ſenſible Attraction when the Line that ſupported them was raiſed thirty-eight Inches above the Line of Communication.

October the 30th I repeated this Experiment, and now when the Line that ſupports the Ivory Balls was elevated about an Inch above the communicating Line, either Ball attracted the Thread at the Diſtance of more than a Semi-diameter of the Ball, and at the Height of ten Inches, at leaſt half the ſame Diſtance.

By theſe Experiments we find, that the Electrick Vertue may not only be carried from the Tube by a Rod or Line to diſtant Bodies, but that the ſame Rod or Line will communicate that Vertue to another Rod or Line that is at a Diſtance from it, and by that other Rod or Line the Attractive Force may be carried to other diſtant Bodies. I am,

SIR,

Yours, and the Royal Society's,

Moſt Obedient Humble Servant,

Stephen Gray.

Charter-Houſe, Oct. 15, 1732.

LET.

LETTER II.

SIR,

THE Subject of Electrical Attraction at a Diſtance, without any Contact of the Line of Communication either by the Tube, or the ſaid Line not touching the Attracting Body, being ſo very ſurprizing, I preſume the following Account of the Experiments I have ſince my laſt made on that Subject, may not be unacceptable to the Society.

A ſmall Hoop of about twenty Inches Diameter, and an Inch and a half in Breadth, being ſuſpended by two Threads of Silk, ſo as that it hung perpendicular, and in a Plane at right Angles to the horizontal Line of Communication, which paſs'd through, or at leaſt very near to the Center of the Hoop, I went to the End of the ſaid Line, and applying the excited Tube near it, there was an attractive Influence communicated to the Hoop in all Parts of it. Then by a Skrew-Hole made in the Side of the Hoop for that Purpoſe, I ſkrewed it upon the Top of a Pedeſtal that was about two Feet and a half in Height, ſetting it upon a Cake of Roſin, ſo as that the before mentioned Line might paſs through the Center of the Hoop, and found that whether the Hoop was placed ſo as its Plane was at right Angles, or in any other Angle with the Line of Communication, the Hoop attracted after the ſame manner as it had done when ſuſpended on the ſilk Lines.

Some time after I made the following Experiment. Into the Noſe of a Glaſs Funnel I put the larger

End of the Top of a ſmall Fiſhing-Rod, and upon the leſſer End a Ball of Cork; then the Funnel was ſet on the Floor of the Room ſo as that the Rod was at ſome Inches diſtance from the Line of Communication; then the Tube being excited, and applied near the End of the Line, the Electrick Vertue was conveyed by it to the Cork Ball, and it attracted ſtrongly when the Ball was, by Eſtimation, not leſs than two Feet Diſtance from the aforeſaid Line.

December 11, there being a hard Froſt, and a fair Day, I repeated the Experiment, making uſe of a large Hoop that was about forty Inches Diameter, and ſetting it perpendicular upon a hollow Cylinder of Glaſs, which was ſix Inches long, and five Inches and a half Diameter, ſo placing the Hoop that the Line of Communication might paſs through, or at leaſt very near to the Center of the Hoop; then applying the Tube to the End of the Line, there was an Attraction communicated to all Parts of the Hoop, attracting a pendulous white Thread at the Diſtance, by Eſtimation, of about half an Inch. I then ſet the Hoop ſo as the inward Surface of the Hoop might touch the Line, and then communicating an Attraction by the excited Tube to the Packthread, the attractive Vertue was carried by it to the Hoop, and cauſed it to attract with that Force, as with the remoteſt Part of the Hoop to attract the Thread at a Diſtance, by Eſtimation, of about four Inches.

Some time after the 'foregoing, I made the following Experiment. The large Hoop being ſet upon the Glaſs Cylinder, and the Packthread paſſing through, or near its Center, the Tube being applied near

near the Hoop gave it a ſtrong Attraction, ſo that it would attract a Thread at the Diſtance of ſeven or eight Inches, and at the ſame time there was an Attraction communicated to the Packthread. Then I ſuſpended an Ivory Ball, of two Inches Diameter, at the other End of the Packthread, and applying the Tube to the Hoop, there was an Attractive Vertue carried to the Ball, and it would attract the pendulous Thread at the Diſtance of near an Inch. I then placed the Ball in or near the Center of the Hoop, and now it was ſo far from being attracted, that it was repelled by the Ball, but was attracted by the Packthread paſſing to it in the Arch of a Circle, whoſe Center ſeem'd to be that of the Ball.

This is all that I have at preſent to communicate, who am,

SIR,

The Society's, and your

Moſt humble Servant,

Stephen Gray.

II. EPHEMERIDES METEOROLOGICÆ, Barometricæ, Thermometricæ, Epidemicæ, Magneticæ, ULTRAJECTINÆ *conſcriptæ à* Petro Van Muſchenbroek, *L. A. M. Med. & Phil. D. Phil. & Matheſ. Profeſſ. in Acad.* Ultraj. Annis 1730, & 1731.

EPHEMERIDES Anni 1730.

SI per totum Terrarum orbem unanimi opera Meteoris obſervandis notandiſque incumberent Philoſophi, breviſſimo tempore Hiſtoriam ventorum, anniverſariorum, liberorum, conſtantium, motionumque abſolutam haberemus, qui enim Ephemerides, ubivis conditas, inter ſe compararet, originem cujuſcunque venti, iter quod abſolviſſet, ubinam deſiiſſet, manifeſto detegeret: videret hic quomodo a ventis nubes verſus quaſdam delatæ plagas ab oppoſitis ventis fuiſſent condenſatæ, aut ab aliis admiſtis nubibus, ex diverſiſſima terræ regione generatis, debebant producere pluvias, novos ventos eorumve impetus intendere, efferveſcentias ſuſcitare, fulmina incendere & tonitrua; quorum omnium cauſam nunc tantum conjectando aſſequimur, aut ignoramus: Videret harum Ephemeridum ſpectator univerſæ Atmoſpheræ fabricam, & indolem; de quâ vix aliquid hucuſque propter obſervationum penuriam cognoſcimus. At dolendum pauciſſimos ejuſmodi Ephemeridibus conſcribendis eruditos operam navare, adeo ut vix ex hac alterave

alterave comparata inter ſe multum lucis utilitatiſque capi queat: excitavit acutiſſimus *Jurinus* Epiſtola invitatoria aliquos, qui alacri animo hunc laborem non detrectarunt: gaviſus ſui Lipſiæ diligentiſſimum Philoſophum accuratiſſimas Eruditorum actis inſeruiſſe Anni 1730, Obſervationes Meteorologicas, quæ cum noſtris comparatæ oſtendent, quantum eodem die variet Lipſiæ & Ultrajecti Atmoſphera, quam diſcrepantes regnaverint Venti: quantum gravitas incumbentis aëris major huic quam alteri loco fuerit, quæ cuncta ſpectatorem voluptate certo certius perfundent: ſperanda in poſterum meliora tempora, quibus plures Ephemerides ſimul lucem adſpiciant; nunc ad noſtras nos convertamus.

Januarius admodum moderate friguit, exhibuitque plurimos ſerenos dies; gelavit, ſed cum frigidiſſima erat tempeſtas, Thermometrum modo ſubſedit ad gradum 18, idque ſemel tantum. Fuit Mercurius in Barometro die vigeſimo primo ad altitudinem 29 $\frac{10}{12}$ poll. quæ tanta eſt, ut non meminerim me eam unquam majorem animadvertiſſe. Cœlum adeo pulchrum & ſerenum nec magnis nec ſubitaneis mutationibus caloris obnoxium fere omnes a mortalibus ægritudines proſcripſerat, ſi Variolas excipiamus, quæ confluentes, malignæ, ejuſdemque indolis erant, ac ſub finem elapſi anni notavi, pauciores tamen, quos invaſerant, interfecerunt. Acus Magneticas in eodem reliqueram ſtatu ac præterito anno, nolens eas vi nova, ductu ſupra Magnetem, impregnare: manſit vis Magnetica per totum annum in Inclinatoria acu ſatis vivax, quid Declinatoriæ contigerit menſe Maio, infra notabo. Maxima inclinatio hoc menſe fuit 73° 25'.

Minima

Minima 72° 45′. Declinatio maxima 13° 21′. Minima 12° 58′.

Februarius ſatis humidus fuit, moderate frigidus, pauciſque aquilonaribus agitatus, nullæ in Atmoſphera magnæ aut ſubitaneæ caloris frigoriſve viciſſitudines, unde pauciſſimi ægrotantes: Variolæ tamen manſerunt confluentes, minus malignæ prioribus. Die decimoquinto, hora veſpertina decima Auroram Borealem detexi, ſive nubem modo lucentem, nullos vibrantem radios; cum nihil inſoliti continere videbatur, ipſi ulterius obſervandæ non impendi tempus aut operam: vidi in Britannorum Actis Philoſophicis, eodem die Genevæ Auroram Boream placidiſſimæ lucis ſpectatam quoque fuiſſe, ejuſque elegantem deſcriptionem cum Societate communicatam in N° 913. pag. 279.

Inclinatio acus maxima fuit 74° 10′. Minima 73° 15′. Declinatio maxima 14° 6′. Minima 13° 8′.

Admodum pluvioſus fuit *Martius*. In Baroſcopio Mercurius plerumque humilis, nullæ tamen tempeſtates ſævierunt, quibus cæteroquin hic menſis infamis evaſit. Aquilonares pauciſſimi ſpirarunt, hinc ſalubre cœlum, vix morborum ſemina afferens diſpergenſve: Jam mitiores evaſerunt Variolæ, diſcretæ hinc inde dabantur, neque confluentes adeo copioſæ, aut lethales quam ſuperioribus menſibus. Sexto die horâ veſpertinâ octavâ Auroram Borealem ſpectavi; hæc exigua erat; nubes in plaga ſeptentrionali parva, 10 gradibus ſupra horizontem elevata, inæquali terminata limbo ſuperiori, alba ſuperius, nigrior inferius, virgas aliquot emiſit lucentes, breves vix 30 gradibus ſupra horizontem elevatas, quæ ſe mutuo

mutuo excipiebant, interjecto tamen notabili temporis intervallo, quo nihil apparebat: hora decima nullum amplius ejus veſtigium dabatur.

Inclinatio acus maxima fuit 75 grad. minima 66° 15′. Hic tamen aliquid mirandum contigit, cum enim vigeſimo quinto die inclinatio erat maxima 75′ graduum, poſtero die fuit tantum 66° 15′. Nulla tamen hujus diſcriminis cauſa in ædibus meis fuit, eſtque hæc acus Inclinatoria illius indolis & probitatis, ut ſi ex ſitu ſuo turbatur, intra horam eundem Inclinationis gradum oſtendat, quemadmodum pluribus ſpectatoribus, atque inter eos nuper Maximo Sagaciſſimoque Philoſopho *J. Th. Deſaguilerio* me amiciſſime inviſenti oſtendi. Magis admirabar hoc Inclinationis diſcrimen, cum acus altera, quæ Declinationem oſtendit, modo unius minuti differentiam exhibuerit: Quot non reſtant in Magnetica ſcientia a poſteris enucleanda? Inter omnes obſervationes hujus menſis in acu Inclinatoria captas, magnas mutationes obſervavi, nunquam vero vidi minores aliquo menſe, quam fuerunt illæ in acu Declinatoria.

Lætus, moderate ſiccus ſucceſſit menſis *Aprilis*, cujus grato calore læte germinabant arbores & plantæ, ita ut opima meſſis ex ridentibus undique pratis florentibuſque & virentibus arboribus ſpe maxima haberetur: fertilia bis mugiebant tonitrua: ſemel lumen Boreale apparuit, nihil præter ſolitum exhibens. Pauciores iterum regnabant Variolæ: Vernales Intermittentes Tertianæ more ſolito in Scenam prodierunt, nequaquam pertinaces, aut malignæ, nec etiam copioſæ, nec inſueta ſymptomata excitantes. Hinc inde Peripneumoniam animadverti, ſed benignam, quæ nonnunquam ſponte reſolvebatur, aliquando Venæ

ſectio-

ſectionem & remedia poſtulabat; pauciſſimos interemit.

Inclinatio acus maxima fuit 72° 30′. Minima 68° 45′. Iterum hoc menſe idem prodigium contigit, quod ſuperiori; ut nempe acus ex Inclinatione maxima redierit ſequenti die ad minimam: acu declinationem oſtendente vix ulla interea temporis mutatione agitata. Declinatio maxima fuit tantum 13° 7′. Minima 12° 46′. Tantopere motu retrogrado acus nautica hoc menſe delata fuit.

Quoties menſe *Maio* non mugierunt tonitrua? Vix id frequentius ullo tempore obſervatum fuit: eſt tamen Maius in his regionibus ſemper tonitruum ferax; quippe tellus frigore præteritæ hyemis conſtricta, vix exſpirare ex ſe olea, ſulphura, ſalia potuit: ſimul ac idcirco calore Aprilis & Maij aperitur, affatim in Atmoſpheram exhalationes aſſurgunt oleoſæ, ſalinæ, diverſiſſimæque indolis, quæ permixtæ ſecum, efferveſcunt, inflammantur, fulmina fulgura & tonitrua excitant.

Spiraverant in menſis principio Aquilonares Venti, ilico hinc Anginæ & Tuſſes oriebantur; Inflammatoriæ erant Anginæ omnes, Amygdalæ admodum tumentes & rubræ; nonnullæ Synanchæ, aliæ Cynanchæ erant: nec niſi larga repetitaque Venæſectione purgatione, faucium fotibus externis, gargariſmatibus, diluentibuſque potibus profligari poterant: Tertianæ quoque ab hoc Vento crebriores; eo enim inimicior corpori humano hoſpes vix datur: aderant adhuc Variolæ, ſed pauciores mitioreſque.

Inclinatio acus maxima fuit 72° 25′. Minima 70° 45′. Declinationem obſervavi uſque ad diem decimum nonum, quo hora undecima ante meridiem fulmi-

fulminaverat, vidi fulmen ſupra ædes, ſed tamen in altiori cœli parte tranſiiſſe, ita ut nullam actionem ab ipſo exſpectaverim ; hora duodecima venio obſervatum in horto, quomodo ſe declinatio acus Magneticæ haberet, ſublato operculo avocor quodam caſu, interim exigua pluviæ copia, vix memoranda cadit, quæ parumper vitrum, quo acus tegitur in capſula, ipſamque acum humectaverat ; abſtergeo accurate, impono ſtylo, quid noto ! paralytica evaſerat quaſi acus, vi orbata Magnetica, quieſcens ſemper quocunque in ſitu poneretur : duco ſupra egregium Magnetem hanc acum, bene imprægnari noluit, cum nunquam verſus plagam, ad quam aliæ acus ſuper eodem Magnete ductæ, diregebatur : capituli cavitatem polivi, purificavi, applicationem acus ad Magnetem repetii, æque vano cum ſucceſſu : tum ad dexterimum fabrum Amſtelodami miſi, qui cum ante biennium ipſam mobiliſſimam fecerat, nunc irrito conatu variis temporibus reſtituere eam cupiebat; ſed non potuit coactus fabrefacere novas: excurrit idcirco multum temporis, quo Declinationem acûs notare non potui, atque ideo hiulcum harum obſervationum ponere coactus fui. An hic effectus a fulmine? Affirmari non audeo, ſed contigit tempore fulminis, quod ſi acum tetigiſſet, explicari ex analogis obſervationibus, quas in Diſſertatione de Magnete collegi, utcunque poſſet.

Junius paucos exhibuit ſerenos dies, temperatus admodum, hinc morbi acuti rariſſimi fuere, Tertianæ intermittentes adhuc dabantur, ſed benignæ ſatis, & facillimæ curatu, jam pauciſſimæ Variolæ, quæ ultra annum ſævierant. Inclinatio acûs maxima fuit 74° 31′. Minima 71° 50′.

Maxima maduit *Julius* pluviæ copia, unum alterumve ſerenum modo exhibens diem : calor multo minor erat, quam quem Cerealia aut fructus arborum ad maturitatem legitimam poſtulabant ; inundabantur paſcua, imo quæ nunquam aquis obtecta fuerunt, jam oceani faciem, ad altitudinem duorum pedum ſub aquis demerſa, induerant : Fluvius Lecca ad ſummas uſque oras impletus, tranſcendiſſet aggeres, niſi vigilatum prudenti præfectuum conſilio & induſtria fuiſſet : jam deſperare colonus de meſſe, anxiuſque altiora pro pecore paſcua quærere. Non tamen ubivis terrarum hic menſis æque pluvioſus, conſule Richterianas obſervationes circa Lipſiam captas, ſerenos fulſiſſe ſæpe Soles invenies, imo & ita in Gallia ſe habuit tempeſtas. Utcunque humeſcebat *Julius*, morbos tamen non produxit, ſoletque hic menſis plerumque Æſculapii filiis ferias aliquas largiri.

Inclinatio acûs maxima fuit 77° 25′. Minima vero 72° 15′.

Fuit *Auguſtus* quoque in principio admodum humidus ; computruerunt ex arboribus mala pyraque, quorum fructuum in Trajectina Diocœſi magna penuria : quam deploranda ſeges ! grana tritici exigua, plurimum furfuris, parum farinæ concludentia, maxima pars propter pluvias continuas germinaverat : collecta hæc Ceres vix emtores invenit, quippe menſura, quæ 7 ½ florenis vendebatur præteriti anni tritico impleta, vix tribus florenis extrudi potuit. Incipiebant Tertianæ intermittentes, Autumnalium more, ſed ſatis benignæ. Fuerunt quoque Synochi, ſimplices, ſed qui nulla ſymptomata ſingularia, aut decurſum extraordinarum habuerunt.

Incli-

Inclinatio acûs maxima fuit 76° 30′. Minima 70 graduum.

September iterum pluvioſus, pulchros tamen dies aliquot in initio conceſſit, poſt duodecimum, nullum amplius. Aurora Borealis fulſit decimo die, veſpera ab hora decima ad undecimam, ex nube vix ſupra horizontem in parte Borea lucentes virgas ejaculans, nihil inſoliti edens.

Jam plures Tertianæ & Quartanæ Febres intermittentes viſebantur, non tamen mali moris, cæteroquin quia temperatus calor, vix alii morbi acuti regnabant.

Inclinatio acûs maxima fuit 70° 30′. Minima 69° 15′.

Octobri cœlum pluviæ maxima parte orbatum purgatumque quidem, ſed frigidius propter humidum præteritis menſibus ſolum; pauci quoque ſereni dies, hinc non maturuerunt in noſtris Terris uvæ; in Gallia contrarium obtinuit, ubi September & October ſatis calidi excoxerunt egregie uvas, ſuppeditaruntque Vinum generoſiſſimum, & præſtantius quam aliquibus anteactis annis. Pauci quoque hoc menſe morbi, aliquot Tertianæ ſimplices, duplices, Quartanæ quoque, non pertinaces.

November pluvia abundans, temperate tamen frigidus: & quia totus annus humidior frigidiorque ſolito fuit, boves in paſcuis lætiſſime veguerunt, pinguiſſimæ factæ, nec aliter ſe habuerunt Aves omnes, gallinæ, feræ quælibet, adeo ut fructuum damnum obeſioribus bobus reſarcitum expertus fuerit colonus. Quinto & ſexto die Auroram Borealem obſervavi, nihil inſoliti exhibentem: fuerunt hæ binæ hujus anni ultimæ Auroræ, adeo ut fulſerint ſexies: intuen-

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do omnes animadvertebam, non curare has Auroras quinam venti ſpirent, ex quacunque etiam plaga. Cum tamen in plagis Boreis primum ſemper apparent, indeque verſus Auſtrum ferantur, earum materia altiori in aëris regione natat, quam in qua venti inferiores dominantur : promoventur autem Auroræ a Borea verſus Auſtrum, proculdubio a vento ſuperioris Atmoſphæricæ regionis hac directione latæ.

Jam Inclinatoria acûs maxime depreſſa fuit ſub horizonte, quando cum eo angulum 69° 30′ fecerit, minime ſub angulo 68° 50′.

Decembri notanda eſt ſubitanea ponderis Atmoſpherici mutatio, cum enim vigeſimo ſecundo die Mercurius nocte in Baroſcopio ſuſpendebatur ad 28 $\frac{8}{12}$ pollic. mane adſcenderat ad 29 $\frac{1}{2}$ pollices. Quæ mutatio intra 8 horas contigit.

Inclinatio acûs maxima fuit 69° 25′. Minima 67 graduum.

Fuit aër poſteriori ſemeſtri hominibus ſaluberrimus, ita ut pauci morbi, paucique diem ſuum obierunt, imo niſi prioribus hujus anni menſibus Variolæ plures ſolito extinxiſſent, ſolito parciora funera texiſſet humus.

Pluviæ copia, quæ hoc anno cecidit, perpendicularem altitudinem 33 pollicum, 5 $\frac{1}{3}$ lineas æquavit : In vapores autem modo abierunt 28 pollices, 1 $\frac{1}{3}$ lineæ : adeo ut plus pluviæ ceciderit, quam evaporatum fuerit, quod oppido raro, ſed id evenit, quia annus frigidus humidiſſimuſque fuit.

EPHE-

EPHEMERIDES Anni 1731.

JANUARIUS Frigus moderatum attulit: quæ notari merentur hoc menſe, ſequentia ſunt: gelabat diebus 14, 15, 16, 17, parum quidem, gelabat tamen, erat vero Mercurius in Baroſcopio admodum depreſſus, venti ſpirabant Auſtrales, ſed pigri: mirabar hoc, cum vix aut nunquam gelu inchoaſſe animadverterim Baroſcopio adeo depreſſo iiſque comitantibus ventis, deſiit admiratio ſimulac percepererim in littoribus Luſitaniæ & Hiſpaniæ ſæviiſſe impetuoſiſſimas procellas, plurimas frangentes naves, triſtiſſimæ Tragœdiæ cauſas: dominabatur ibidem Ventus Auſtralis, qui quoque inde delatus ad noſtras uſque regiones, ſuas vires in aërem noſtrum exercuiſſet, niſi Boreas oppoſita directione ipſi reſtitiſſet; aër inde piger & tranquillus, quemadmodum Luctatores pari niſu, ſed oppoſito, in ſe agentes quieſcunt: ſuperante Auſtro, hic flare obſervabatur, ſuperante Borea hunc regnare vidimus. Quam ſobrie de futura atmoſphæræ conditione ex altitudine Mercurii in Baroſcopio ratiocinandum eſt! quippe vigeſimo ſexto, ſeptimo & octavo die hujus menſis regelabat, Mercurio jam perquam alto exiſtante; & flante Vento Orientali: vix credo aliquem majores circa Barometrum Anomalias obſervaſſe unquam.

Variolas obſervavi aliquas, paucæ fuerunt, plerumque diſcretæ, quibus pauci infantes perierunt. A medio Januarij inceperunt Pleuritides, corripientes modo Operarios & ruſticos, mitioris indolis, raro in ſuppurationem tendentes.

Fuerunt quoque Tertianæ duplices, quæ ſolo ſalium aut Amarorum uſu brevi & feliciter curabantur.

Simulac regelabat, Coryzæ exſtabant. Lecca fluvius hoc menſe parcam aquæ copiam in ſe complexus fuit.

Jam mihi nova aliquot Verſoria comparaveram, ut iterum Declinationem Magnetis obſervarem: Acum Inclinatoriam ſibi reliqueram, viſurus an vis Magnetica, ante biennium cum ipſa communicata, adhuc anno hoc ſatis vegeta perſtaret? Docuit experientia vim ſummopere hoc anno decreviſſe, ita ut menſe Decembri acum denuo ſupra Magnetem ducendam eſſe judicaverim, noviſque his imbuta viribus multo magis inclinabat, ſuſpicor tamen vires ſatis ipſi conſtitiſſe uſque ad menſem Junium: Hiſce detectis arbitror nunquam nautas tuto ſuis confidere Verſoriis poſſe, quæ ultra biennium Magneti applicata non fuerunt.

Inclinatio maxima acûs hoc menſe fuit 68 graduum, minima 67° 20′. Declinatio maxima 14° 55′. Minima 14° 15′.

Februarius diuturuum gelu, ſed moderatum, comes habuit; id incepit die ſecundo, & abſque interruptione gelavit uſque ad finem vigeſimi. Poſt ſextum diem Mercurius in Barometro deſcendit, donec ad infimam fere ſtationem ſui die octavo & nono pervenerit; cœlo utcunque ſereno, placidis ventis, ex quacunque afflantibus plaga, perſtante gelu: ſed ejuſmodi anomaliis luxuriare inceperat, pergere ita ſtudebat annus. Nocte diei quinti valde fulguravit, in aliis Hollandiæ urbibus ferocia micuerunt fulmina, & tremenda mugierunt tonitrua, præcipue

cipue ſupra pagum Alſmeriam : Duodecimo die cecidit veſperi intra horam ſextam & octavam ingens nivis quantitas, quæ altitudinem 15 pollicum æquavit, cum admiſta pluvia rara & tenuiſſima, tam prodigioſam nivis copiam intra breviſſimum tempus delapſam in hac regione nunquam obſervavi : Nivem ſolvi, ſoluta dedit 20 aquæ lineas : hæc nix proinde modo novies rarior aqua erat : contigit hoc prodigium nocte præcedente Lunæ quadraturam. Ob continuatum gelu Fluvius Lecca obriguit : poſt diem vigeſimum blandiſſime regelavit, ſoluta feliciter fluviorum glacies nullam cladem aggeribus intulit.

Hoc frigore durante ſiluerunt fere morbi : Variolæ fuerunt, ſed benignæ, diſcretæ, vix quemquam è medio tollentes. Copioſa nix cum ſubſequentibus aquilonaribus poſt diem duodecimum Arthritidem excitavit, quæ fævior fuiſſet, ſi aut majus regnaſſet frigus, aut Boreas diutius infeſtaſſet ; verum clementioris genij auſtrales non exiguum ſolatium ægritudini huic attulerunt. Cum vero per longiſſimum tempus, octodecim ſe ſequentium dierum, gelu abſque intermiſſione corpora conſtrinxerat, impedita in nonnullis perſpiratio fuit ; hinc Diarrhœæ, non prius deſinens, quam abundans in corpore materies excreta fuerit, reſtitutaque libere perſpiratio ; promptiſſimum idcirco remedium fortis purgatio & poſtea blandum ſudoriferum. Verum alios invaſit Angina inflammatoria, diuturnior quam periculoſior ; profligata cito Venæ ſectione, inprimis repetitis purgantibus. Poſtquam regelare cœpit, & aër pluviâ humeſcere, Tuſſes oboriebantur, auſtris humidioribus valde relaxantibus pulmonum veſiculas, adeo ut oſcula

tula excretoriorum laxiora, nimisque patula, huc plus liquidi non nisi tusse excreandi, demiserint.

Inclinatio acûs maxima 68° 30′. Minima 68 graduum. Declinatio maxima 14° 20′. Minima 13° 45′.

Martio mense fere semper spiraverunt Venti Aquilonares, ingrata tempestate æque Vegetantia ac Animalia afficientes : Hinc multi morbi, Arthritis, Pleuritis, Febres acutæ continuæ, Tertianæ intermittentes, Quartanæ, Variolæ : post decimum quartum diem animadverti eos, qui Phthisi laborabant, multo pejus se habuisse, valde anxios fuisse : causam suspicari poteram nullam præter antecedentes, diu continuatos Aquilonares.

Diei septimi vesperâ Auroram Borealem observavi, exiguam, nihil insoliti ferentem.

Inclinatio acûs maxima fuit 69° 15′. Minima 68° 20′. Declinatio maxima 14° 58′. Minima 13° 30′. Inter diem quintum & sextum discrimen Declinationis evasit æquale uni gradui, Inclinatione manente immutatâ.

Aprilis fuit siccus, valde frigidus, plurimis aquilonaribus infestus, steriliſque ; hinc mense hoc elapso nondum ulla virebat arbos, sub finem florere cæperunt mala armeniaca, verum frigore perierunt flores ; mala persica dein amiserunt flores, qui multum a frigore passi, fœcundiores tamen fecerunt fructus.

Jam crebriores Arthritides ingrati frigidique Aquilonares excitaverunt : jam Tertianæ simplices & duplices, Vernalium more, sed copiosiores fuerunt, nequaquam tamen malignæ aut pertinaces.

Inclinatio

Inclinatio acus maxima fuit 70° 40′. Minima 68° 45′. Declinatio maxima 16 Graduum, minima 14° 25′.

Maius in principio ingratus frigiduſque, verum die quinto poſt meridiem maxima ſubito contigit mutatio, ex cœlo cadente calida pluvia, clementiorem reddente aërem, hinc poſteris diebus catervatim ex arboribus erumpebant folia floreſve, & jam plurima læta virere nitebantur, niſi iterum a die decimo uſque ad decimum quintum noctes frigidiſſimæ omnia iterum gelu conſtrinxiſſent ; hinc nulla creſcebant legumina, denſa glacie obducta Terra ſingulis noctibus ; poſtquam decimo octavo die tonuerat, miteſcere cœlum cœpit. Interim quinto die propter celerrimam atmoſphæræ mutationem ex frigida in calidam, ilico aderant Anginæ, leviores tamen, ſuâ ſponte evaneſcentes. Sequenti die Colicos dolores abſque febribus notavi, hi noctu corripuerant homines antea ſaniſſimos ; cauſam invenire non potui, niſi in ſubitanea caloris frigoriſque viciſſitudine ; neglexiſſem hunc morbum, niſi eo die mane inviſens ægrotos, primos quatuor, in variis ædibus tamen habitantes, de iis doloribus conqueſtos audiviſſem, tum vero ab aëre pendere ſuſpicatus, levioremque in Inteſtinis inflammationem dari ; Venam ſecandam judicavi, optimo cum ſucceſſu ; in quibus id neglexeram, propinaveramque ſpirituoſa calida, opiata, morbus per triduum duravit, nec niſi Venæ ſectioni & diluentibus profligatus fuit. Eodem tempore frequentes oriebantur Raucedines & Tuſſes, abſque febre, quæ tamen poſt mediam noctem exacerbabantur ; pertinaciſſimæ hæ fuerunt, non auſcultantes Venæ ſectioni, purgantibus, ſudoriferis,

blandefacientibus; ſed tempus diuturnum poſtulabant, tum Mellita, atque Opiata.

Decimo quarto die Lumen fulſit Boreale, quod nihil, antea non notatum ſæpius, ſpectandum dedit. Inclinatio acus maxima fuit 72° 50′, Minima 68 Graduum. Declinatio maxima 16° 30′. Minima 15 Graduum.

Junio Synochos ſimplices obſervavi, quos nulla malignitas comitabatur, ideo facile curati largâ Venæ ſectione & nitroſis, diluentibus, refrigerantibuſque potulentis. Erant quoque Variolæ, ſed ejus naturæ, ut nunquam mitiores fuerint, aut eſſe poſſint; exoptaſſet unuſquiſque nunc ſibi hunc morbum, ſi poſtea ſe liberum immunemque ab eodem fore, ſibi perſuadere potuiſſet; erant Variolæ diſcretæ, paucæ, exiguæ, quibus infantes aliqui non aut vix ægrotabant, nequaquam decumbere coacti; ſuppuratæ jam ſexto die erant omnes puſtulæ, & penitus exſiccatæ nono die. Verum peſſimæ Coryzæ fuerunt, diutiſſime durantes, propter ingentem tempeſtatum varietatem, quippe ſi nunc regnabat magnus calor, eum poſtero die magnum frigus, ab Aquilonaribus advectum excepit. Suſpicor omnes Inclinationes, quas acus oſtendit ab hoc menſe uſque ad Decembrem, eſſe minores quam par erat, propter vires magneticas longinquitate temporis minutas.

Declinatio maxima fuit 16° 30′. Minima 15° 50′.

Julij vigeſimo quarto die adeo terribilia corruſcarunt fulmina, concomitantibus tonitruis admodum crepitantibus mugientibuſque, ut nunquam ſimilia viderim vel audiverim, inceperunt poſt meridiem hora 4 ½ deſiverunt hora ſexta: multa tamen damna urbi non intulerunt; hinc inde lapides ex caminis dejecti,

tegulæ

tegulæ ex tectis; duæ arbores prope urbem Fiſſæ, & pro parte deglubitæ, ubi fulmen decurrerat: tactus, qui ſub una arbore hoſpitium quæſiverat ab hoc fulmine, civis ſuburbanus.

Jam toto hoc menſe cœlum mite, clemens, ſerenum, fertile, hinc opima Meſſis, præteriti anni penuriam compenſans; adeo ſalubris fuit hæc tempeſtas, ut vix aliqui ægrotaverint. Declinatio acus maxima 16° 10′. Minima 15° 40′.

Auguſtus admodum calidus fuit, ſed cœlum adeo clemens, benignum, ſalubre, ut melius exoptari à mortalibus non poſſet: hinc pauciſſimæ ægritudines. Pomona vero adeo fæcunda, ut nimiam protulerint optimorum fructuum & maturorum arbores copiam, & vix pretium fructibus ſteterit.

Declinatio maxima acus fuit hoc menſe 16° 5′. Minima 15° 35′.

September cœlo quoque gaviſus fuit temperato & miti, paucis infeſtus Aquilonaribus: protulit anginas aliquas inflammatorias acutiores, & mitiores; protulit quoque Tertianas & Quartanas, intermittentes, minus tamen in civitate quam ruri: Erant hæ ex genere Autumnalium, non auſcultabant Lixivioſis ſalibus, aut amaris antifebrilibus: verum feliciſſime centenos curavi, propinando vomitorium, idque interdum bis, tum decoctum amarum per paucos dies, deinde Corticem Peruvianum, quâ methodo radicitus exſtirpatæ ſunt, neque recruduerunt.

Declinatio acus maxima fuit 15° 55′. Minima 14° 20′.

October fœcundus fuit in progignendis luminibus Boreis, quinque enim apparuerunt: die tertio, veſperâ ab hora octava ultra duodecimam nocturnam,

cœlo admodum placido & quieto ingens lumen Boreum dabatur, emittens lente ſuas columnas ab horizonte verſus Zenith, quæ diutiſſime perſtabant nullis interruptæ ventis.

Die ſeptimo ingens Aurora Borealis ſpectabatur, totum cœlum clarius illuſtrans, quam Luna Dichotoma feciſſet, hora ſeptima incepit in plaga Euro-borea, ſed pedetentim proſerpſit quoque ad plagam occidentalem, ita ut ſimul micuerit per totum cœli tractum ab Euro-borea ad Occaſum, adeo exporrecta fuit hora undecima: prope horizontem cœlum erat obductum nube alba, denſiori quam ut Stellarum lucem tranſmitteret: ex hac nube interdum aſſurgebat pars columnæ inſtar, aliquando abrumpebatur pars nubis, inæqualis figuræ, quæ ita divulſa lucebat, lente promota verſus Zenith, nam nullus ventus prope terræ ſuperficiem regnabat: præterea nihil ſingulare habuit.

Die octavo veſperi iterum fulſit Aurora Borealis in plaga cœli Borrolybica: Erant crebræ, interruptæ nubes exiguæ, atræ; ſupra quas hærebant nubes pellucidæ & lucentes, quietæ, non emittentes radios aut columnas: duo ſpirabant ſimul venti, ſupremus erat Hypaquilo, inferior Notus. Supremi venti inferior pars incurrens in ſuperiorem nubium partem, aliquid abripiens ſecum deferebat, quod admodum rarefactum, motuque inteſtino ferveſcens lucere incipiebat: ex his abraſis partibus emittebantur interdum virgæ; ex reliquis tamen nubibus raro exibat columna, quæ parum ſplendebat. Reliquæ Auroræ nihil ſingulare habuerunt.

Fuit

Fuit aër toto hoc menſe ſaluberrimus: hinc pauciſſimæ ægritudines, niſi ſub finem menſis quo ruri potiſſimum Febres, Tertianæ Simplices, Duplices, Quartanæque intermittentes: in civitate multo pauciores fuerunt. Quoniam pomorum & pyrorum tanta ubertas hoc Autumno, ut nullo pretio haberi potuerint, vulgus iis nimium indulſit: hinc Dyſenteriæ, ruri præcipue, in urbe pauciores; non tamen proſerpſerunt, nec contagioſæ fuerunt.

Declinatio maxima fuit 14° 30'. Minima autem 14 Graduum.

November. Quam temperatum, quam clemens huc uſque fuit cœlum! Non Autumnus, ſed Æſtas temperata adeſſe fuit viſa: decimo die extra hanc urbem ſpatians vidi omnes adhuc arbores virentes pauciſſimaque Tiliarum folia flava decidua. Triticum Autumno hoc ſatum, increvit nimis, adeo ut bobus devorandum, graminis loco in paſcuis propinaretur, ne magis excreſcens, futuræ hyemis frigus ferre melius poſſet. Omnes edules herbæ in hortis vegebant, ut menſe Auguſto ſolent, adeo ut etiamſi ſera advenerit Æſtas, diutiſſime tamen blando ſuo calore terram refecerit, manſeritque: fuit vigeſimus ſextus dies ultra modum calidus, etiamſi humidus & flante Borea.

Die ſexto Auroram Borealem ſpectavi, diverſam ab omnibus, quas hucuſque contemplatus ſum: Erat enim cœlum ab Auſtro per Occaſum uſque ad Septentrionem plurimis interruptis nubibus ornatum, quæ omnes quieſcebant, tranquillæ ſuis in locis hærentes, quamvis ventus aliquis regnaret, lucebant omnes alba luce, totum cœlum illuſtrante: Ordinaria fuit Aurora, quæ trigeſimo die comparuit. Plurimæ dabantur

bantur Tertianæ; duplices præcipue, & Quartanæ febres intermittentes, quæ pertinaces non fuerunt, feliciter enim profligatæ ſunt methodo ſupra notata. Variolæ quoque dabantur, paucæ, ſed Confluentes & Diſcretæ, benigne indolis, paucos interimentes, etiamſi copia puſtularum notabili faciem occupaverint.

Maxima declinatio acus fuit 14° 15′, & minima 14 Graduum.

December. Cum jam acum Inclinatoriam virium ſuarum maximam feciſſe jacturam animadverteram eam denuo ſupra Magnetem duxi, viribuſque tantis ac potuit, impregnavi, ilico veram Inclinationem oſtendit 69° 15′. Aliquoties ex ſuo loco turbata, poſt nonnullas oſcillationes ad eundem gradum Inclinationis rediit. Declinatio maxima fuit 14° 21′. Minima 13° 23′.

Variolæ hujus menſis fuerunt ejuſdem generis ac *Novembri* obſervaveram. Præterea dabantur Tertianæ & Quartanæ febres intermittentes, nihil inſolit habentes, nec diverſæ ab iis, quas ſuperioribus Autumni menſibus tractaveram.

Tota pluviæ quantitas, quæ hoc anno delapſa fuit altitudinem perpendicularem modo habuit 17 $\frac{1}{3}$ polli cum rhenolandicorum, quæ exigua eſt, fuit autem annus inter ſicciores numerandus. Sub vaporis form in auras abiverunt 27 pollices 10 $\frac{1}{2}$ lin. quæ copi fere eſt illi æqualis, quam elapſo anno obſervaveram.

Fig. 1.

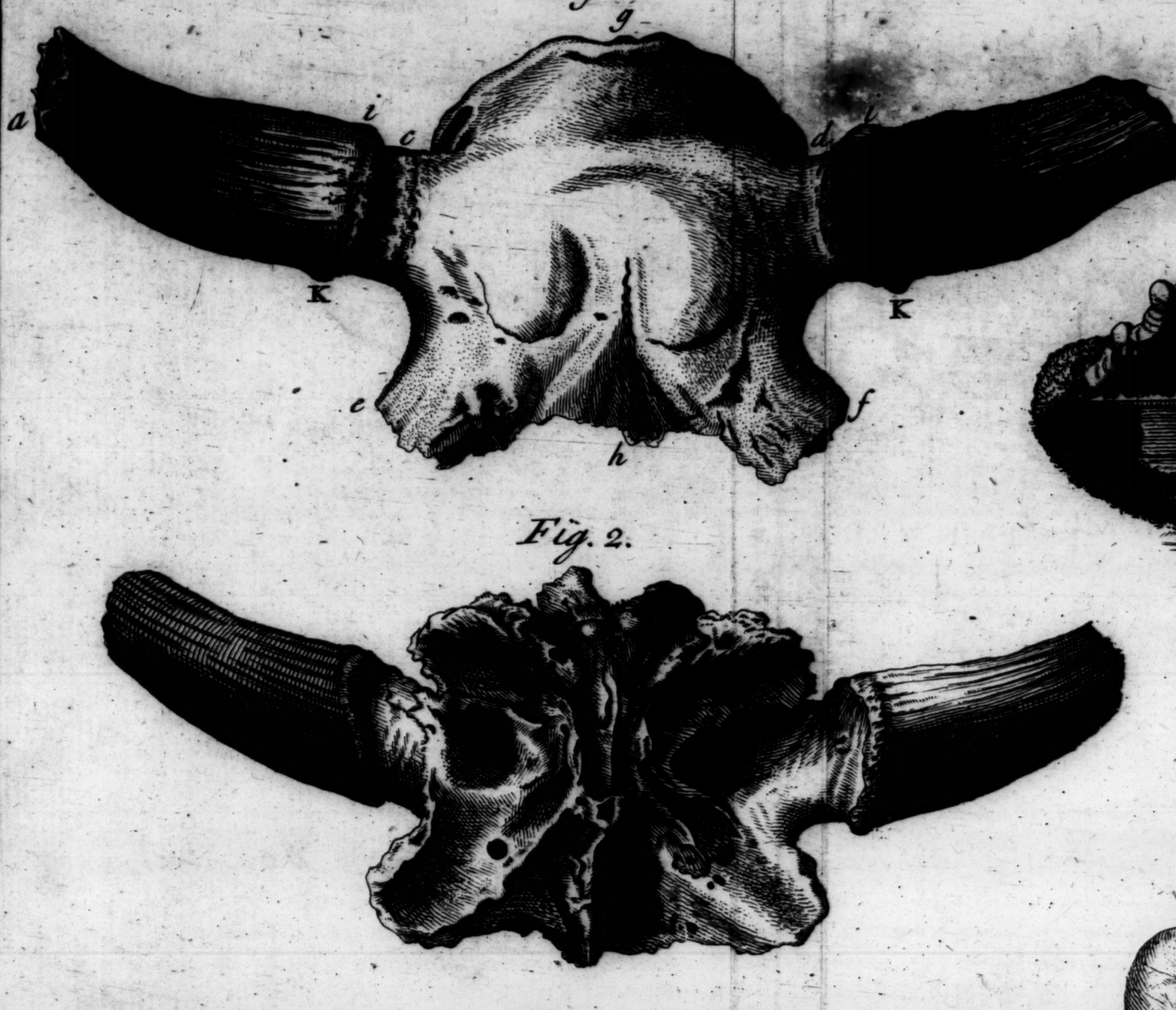

Fig. 2.

Fig. 3.

Fig. 4.

A Scale of 4 Paris feet.

Fig. 5.

J. Mynde Sculp.

III. *A Letter from Mr.* Jac. Theod. Klein, *Secret. Dan. & F. R. S. to Sir* Hans Sloane *Bar^t. Pr. R. S. &c. ſerving to accompany the Pictures of a very extraordinary* foſſile Skull *of an* Ox *with the* Cores *of the* Horns; *of the* Plica Polonica *mentioned in* Tranſact. *N°.* 417; *and of a very large* Tumor of the Eye. *Tranſlated from the* Latin *by* T. S. *M. D.*

S I R,

A Friend from the City of *Dirſchaw* has lately placed in my Collection part of the Skull of an Ox with the Cores of the Horns, which in all Probability muſt have been terrible. It was dug up near the ſaid City, which is three Miles diſtant from hence. I beg leave to ſend you ſome Draughts thereof. Fig. I, repreſents the outſide to the Orbits of the Eyes. Fig. II, the Baſis of the Skull, and Fig. III, the *Occiput*. The Cores of the Horns contain deep longitudinal Furrows; they are not entire at the Extremities, and yet are diſtant from one another.

Fig. I. *a b.* 3 Feet 2 $\frac{1}{2}$ Inches.
c d. 1 Foot 1 $\frac{1}{3}$ Inch.
e f. 1 Foot 4 Inches.
g h. 1 Foot 1 $\frac{3}{4}$ Inch.

i K. The Root of the Horns 1 Foot 6 Inches in Circumference.

l m. The Cores 11 Inches in a ſtrait Line.

I dare not determine to what kind of Bulls this Foſſil is to be aſcribed. I only conjecture it may belong to the *Taurolephantes*, of which you have made mention, in your learned Diſſertation, of a Pair of very extraordinary large Horns, publiſhed in Vol. 34 of *Philoſoph. Tranſact.* N° 397. For as to the *Zubrones* which *Geſner* on the *Urus*, *pag.* 144, mentions from *Munſterus*, there is no ſufficient Proof that the Animal in queſtion was of that Kind.

To this I make bold to add two other Draughts: The one is that of a ſtupendous *Plica Polonica*, which Dr. *Floercke*, Phyſician to the Princeſs of *Radzivil*, got drawn. The *Plica* itſelf was ſent to *Dreſden*, where I ſaw it. It is remarkable, that the Woman affected with this *Plica*, who was a Subject of the Princeſs, and liv'd in the Diſtrict of *Novogrod*, during 52 Years that ſhe laboured under it, never changed her Reſting-Place but twice a Year, *viz.* in Spring and Winter. Upon the Approach of Winter ſhe could endure Cold ſo very well, that ſhe ſhunned all Sort of Heat, even that of a lighted Candle. She never uſed any ſtrong Liquor, but lived on very bad Bread, raw Herbs, and Water, to ſeventy Years of Age. In the Spring ſhe uſed to be carried to ſome Place where the Heat could not eaſily penetrate. She at length died, near two Years ago. [Vid. *Tranſact.* N° 417.]

The

The other Draught is of a prodigious Swelling of the Eye of a Subject of the aforeſaid Princeſs. This Swelling was occaſioned by Hail; and it daily encreaſes and grows hard, except at the Place marked by the Letter *a*, Fig. 5. This Circumſtance is very ſingular, that the Optic Nerve and the Tunicles have ſtretched ſo much, that the Eye quitted its Socket, and fell down to the Beard, Letter *b*. The unhappy Man is ſtill living, and can move this Eye, which weeps, but, as is no Wonder, cannot ſee with it. The Tumour is not painful, but it is very troubleſome to him about his Noſe. If theſe few Curioſities be acceptable to ſuch inquiſitive Philoſophers, as the Gentlemen of the *Royal Society* are, I have my Wiſh. I am, *&c.*

Dantzick, July 4, 1730.

IV. *An Abſtract by* James Douglas, *M. D. Med. Regin. & F. R. S. of a Book, entituled,* A ſhort Account of MORTIFICATIONS, and of the Surpriſing Effect of the BARK, in putting a Stop to their Progreſs, *&c. By* John Douglas, *Surgeon, F. R. S.* London, *Printed for* John Nurſe, *at the* Lamb *without* Temple-Bar. 1732.

THIS ſhort Account of *Mortifications, &c.* which contains Forty-eight Pages in a large Octavo, is dedicated to *Ambroſe Dickins* and

Claudius Amyand, Eſqrs. Serjeant Surgeons to his Majeſty, and divided into three Parts.

In the firſt our Author treats of Mortifications in general, from Pag. 1 to the 6th. What he ſays upon this Head is collected from ſome of the moſt experienced Phyſicians and Surgeons, who all affirm, that a Mortification from an internal Cauſe is always incurable; and when it proceeds from an external one, it can never be cured but by Amputation, or ſeparating the Part affected from the Sound.

In the ſecond Part he gives a very remarkable Obſervation of his own, which proves to a Demonſtration, that a Gangrene, even from an ill Habit of Body, may be cured, contrary to the hitherto received Opinion.

In the third Part, which begins at the 30th Page, he makes ſome Remarks on the preſent Caſe, and adds ſome parallel Obſervations from Mr. *Ruſhworth*, a Surgeon in *Northampton*, who had the good Fortune of making the firſt Diſcovery of the great and ſurpriſing Effects of the *Peruvian Bark* in checking the Progreſs of Mortifications, which he ſays has been likewiſe confirmed by the repeated Obſervations of that incomparable Surgeon Mr. Serjeant *Amyand*, who had often uſed the ſame Medicine, in the ſame Caſe, and with the ſame Succeſs with Mr. *Ruſhworth*.

Our Author ſays further in this Place, that it is only by taking off the Fever that the *Bark* produces all theſe good Effects. But to return to the Obſervation itſelf, which he has given us with a great deal of Judgment and Accuracy from Page the 6th to

Page

Page the 30th. He ſays, that *April* 22, 1732, he was ſent for about fifteen Miles out of Town to viſit a Gentleman near fifty Years of Age.

Upon Examination he found the Back of his right Foot mortified, near the middle Toes, about the Breadth of a Shilling; his Pulſe quick, and his Tongue dry.

There being no Sign of any external Hurt, Bruiſe or Wound, his Phyſician, Apothecary and himſelf were all of Opinion, that it muſt proceed from ſome internal Cauſe reſiding in the Maſs of Blood.

The neceſſary Dreſſings being got ready, he ſcarrified the mortified Part, and cut to the very Bones without being felt by the Patient, having afterward carried his Inciſions through the Skin as high up as the Knee, before ever he began to complain of the leaſt Pain. His Limb was at the ſame time ſtuped with a proper warm Fomentation, and the Wounds dreſſed up, as uſual, with Pledgets dipp'd in hot Oil of Turpentine, and over all a Poulteſs, or Cataplaſm, was laid on of *Theriac. Londin.* Oatmeal and Stale-Beer, the Phyſician preſcribing what Alexipharmicks he judged moſt proper upon the Occaſion.

April 23, Serjeant *Dickins* and Mr. *Cheſelden* being called in, directed the ſame external Applications to be continued as before.

April 24, The Mortification did not ſeem to ſpread.

April 25, His Fever was high, his Tongue very dry, and the Mortification began to ſpread a little. He then ſcarrified again, and deeper.

April 26, The Mortification ſeemed to be at a Stand.

April 27, The Mortification ſpread croſs the Toes towards the Ball of the Foot, which he ſcarrified deeper, and dreſſed as before. The Fever grew higher.

April 28, He was forced to uſe the Actual Cautery, the Mortification getting Ground in ſpite of all he had done.

April 29, He found no Benefit from the Cautery, though applied wherever the Part was corrupted.

April 30, The two Surgeons that had been conſulted before, the Phyſician, the Apothecary, and the Author, were all of Opinion, that even the taking off of the Limb could not ſave him, but that in all Probability he muſt die in twenty-four Hours, his Symptoms being worſe than ever; that is, his Fever was very high, his Tongue dry enough to grate a Nutmeg, his Viſage wild, he had a great Drought upon him, was very reſtleſs, the Mortification ſpread as far as the *Tendo Achillis*, and beſides, the Patient complain'd of a Pain and Hardneſs in the Side of his Belly.

In this deplorable Condition the *Jeſuit's Bark* was propoſed by Serjeant *Dickins*, and agreed to by the other Surgeons preſent, and half a Drachm was ordered to be given that Evening, and repeated every four Hours.

May 1, This Morning he found a very ſurpriſing Alteration for the better, with regard to the Fever, and the other Symptoms complained of the Day before; the Patient had a good Night's Reſt, and the Mortification had made no further Progreſs.

May

May 2, There was a ſmall Diſcharge from the Sore.

May 3, He found two large Abſceſſes on each Side of the Ancle. The Violence of the Fever being taken off by the uſe of the *Bark*, Nature was enabled to form theſe Abſceſſes, and from that he concluded, that the Progreſs of the Mortification was effectually ſtopt. He obſerved upon giving the *Bark* but once in ſix Hours a ſmall Return of the Fever, with a worſe Digeſtion, which obliged him to give it every four Hours as before, and continued in that Doſe for twenty-eight Days in all; and then every ſix Hours for five or ſix Days longer, though the Fever had quite left him all that time.

The whole Quantity of the *Bark* given to this Gentleman amounted to ten Ounces.

May 5, His Pulſe was regular, and the Digeſtion plentiful and laudable. The Muſcles and Tendons on the Sole of the Foot being all mortified, before the *Bark* was given, ſeparated in Proceſs of Time, and fell off very kindly, leaving the Bones of the Toes, *Metatarſus* and *Tarſus* bare and carious, which he afterwards cut off one after another, as he found Occaſion, and could be done with Safety. About the Middle of *November* following the Ends of the *Tibia* and *Fibula* were almoſt covered with a firm *Cicatrix*; the Patient at this time was well in all other reſpects, and was able to walk about by the Help of a wooden Leg, and from that time has continued in perfect Health.

V. *De Uſu* Corticis Peruviani *ad Gangrenam & Sphacelum*, *a* Johanne Shipton, *Chirurgo* Londinenſi.

D. Ruſhworth, Chirurgus Northamtonienſis, literis ad Societatem Chirurgorum Londinenſium datis, Octob. 18, 1731, ſe ad virum vocatum fuiſſe narrat, cui ſphacelus pedis ex interna cauſa cum febre vehementi & pulſu inordinato ad oſſa uſque progreſſus fuerat: atque huic primo ope ſcarificationum profundarum & uſitatorum remediorum ſphacelum cohibitum, febre leniore facta, pulſu quietiore, & pure ad margines ulceris apparente; deinde iterum & tertio recrudeſcentem & latius ſerpentem eadem methodo reſtrictum fuiſſe; tandem Cortice Peruviano in uſum, dum febris remitteret, vocato, febrem & ſphacelum extincta penitus fuiſſe, ægrumque crure abſciſſo ſanum & valentem multis annis vixiſſe teſtatur; idemque ſe aliquoties ab eo tempore expertum eſſe confirmat. Literis hiſce Ds. Amyand, Chirurg. Reg. & Societ. Chirurg. Londin. tunc temporis Magiſter reſpondit, Jul. 29, 1732, ſe jam ad exemplum Ruſhworthi Cortice Peruviano ſepties cum ſucceſſu in ſpacelo uſum fuiſſe, & ſpeciatim in viro 78 annorum, cui ſphacelus pedis ex phlegmone obvenerat, iſque dum quotidie procederet latius, poſt 24 horas a cortice exhibito partes emortuæ ſeparari, puſque laudabile apparere incipiebant: in alio item, cui ſphacelus opem remediorum vulgarium

um per tres ſeptimanas repudiabat; ut & in tertio, ubi ſphacelus puncturis crurum propter hydropem factis ſuperveniens corticis vires ſenſit, malo intra diem unum cohibito, licet æger immedicabili ictero obſeſſus, morboque & remediis exinanientibus exhauſtus, gangræna crus alterum occupante, fato ceſſit: exque his omnibus corticem Peruvianum non minus certum eſſe remedium ad ſphacelum ex cauſa interna quacunque ſanandum, vel certe ad eundem cohibendum, quam ad febres intermittentes profligandas, ſatis conſtare arbitrari ſe profitetur.

Præter iſta notari etiam merentur literæ D. Joan. Douglas Chirurgi ad eundem D. Ruſhworth, Jul. 5, 1732, miſſæ (quod etiam poſtea peculiari ſcripto ad id edito fuſius proſequitur) quibus ſe ad virum quinquagenarium, ſphacelo pedis ab interna cauſa laborantem vocatum, fuiſſe refert: ubi poſtquam ſcarificationes, alexipharmaca intus & extra adhibita, aliaque uſitata præſidia per aliquod tempus fruſtranea fuiſſent, morbo quotidie ſerpente, uſu tandem Corticis Peruviani, quem D. Dickins Chirurg. Reg. cum D. Cheſelden Chirurgo in conſilium adhibitus perſuaſerat experiri, ſphaceli progreſſus ſtatim repreſſus eſt, febris mitior facta, brevique putridæ omnes partes, tendines ſcil. ligamenta, & oſſa omnia pedis, metatarſi, & tarſi ſponte abſceſſerunt, ægro convaleſcente.

Hæc omnia Anglice ſcripta & in unum congeſta pro benevolo ad publica commoda promovenda animo libello minuſculo incluſit, ediditque D. Ruſhworth: quæ ne intercidant, & in oblivionem veniant, ut contingere iis, quæ brevibus chartis deſcripta circumferuntur, vulgo ſolet, utque exteri, qui

qui Corticis Peruviani uſum in febribus intermittentibus ob, neſcio quæ, obventura vel ſubventura mala formidant, hoc ſaltem caſu, quo nihil gravius accidere poteſt, ad eum experiundum animentur; paucis eadem complecti, & Latine exhibere, eaque quæ mihi nuper in ejuſdem remedii uſu obtigerunt, ſubjungere placuit.

Ante annum fere ad virum quinquagenarium, cui ex liberaliori Bacchi uſu, indeque orta cachexia phlegmone pedis in ſphacelum digitorum & metatarſi mutata erat, vocatus ſum. Is, licet plurima alexipharmaca, aliaque ad id malum facientia, interna & externa, per plures dies a D. Dodd, M. D. & Chirurgis DD. Holloway & Green adhibita fuerant, quotidie latius & profundius ſerpſerat, cum febre potius lenta quam ullo modo vehementi & diabete ſpurio, ſeu copioſiori urinæ limpidioris profluvio. Hiſce omnibus evincendis, cum præſertim urinæ quantitas aucta aſtrictorias corticis Peruviani vires expoſcere videretur, & experimenta DD. Ruſhworth & Amyand ſucceſſum pollicerentur, ejus uſum Medico & Chirurgis tentandum propoſui: qui cum membri exſtirpationem nihil valituram ſatis ſcirent, abunde ex pluribus tentamininibus infeliciter factis edocti, aliaque fruſtra uſurpaſſent, facile manus dederunt. Is vero cum ad ℈ij quarta quaque hora per aliquot dies datus fuiſſet, nihil aut ad diabeten, aut ad ſphacelum conferre viſus eſt; ſed per illum humido vitali exhauſto, per hunc carne continue latius abſumta, ægrotus intra duas fere ſeptimanas mortem obiit.

Feliciorem eventum nuper habuit corticis uſus in viro 35 circiter annorum, temperamenti melancholico-

lico-ſcorbutici; qui, dum ex ſclopeto aucupatorio pulverem pyrium eximeret, idque cum manus dextræ vola incautius ori ejus appoſita eſſet, diſploderetur, vulnus per mediam palmam indiciſque & pollicis intercapedinem porrectum, amplum & profundum, cum vaſorum & tendinum laceratione paſſus eſt, quod ſtatim in pago urbi propinquo, ubi tum erat, hæmorrhagia largiore cohibita, deligatum erat. Per aliquot dies gravis dolor cum tumore magno & inflammatione digitos omnes præter pollicem, totamque manum & brachium obſedit, neque quicquam ex vulnere præter ichoris copiam, primo ſanguinolenti, deinde fuſci coloris cum fœtore aliquali prodiit; vulnus etiam ipſum ſubnigrum latius indies patebat, tumorque & inflammatio cum dolore vix diminutus eſt, licet uſitata ad ejuſmodi vulnera remedia uſurpata fuiſſent. Undecimo autem die ſanguis ad uncias aliquot intra ſpatium nycthemeri quater ſponte ſua fluxit, qui bis ſponte etiam ſtetit, bis autem adhibito Sp. terebinthinæ manuſque preſſione reſtrictus eſt, & margines vulneris ſphacelo conſpicuè occupari videbantur. Cum igitur nihil jam reſtare videretur præter uſum ferri igniti ad hæmorrhagiam ſiſtendam, ſimulque ſphaceli progreſſum cohibendum, quando illa fomenta & cataplaſmata, hic faſciarum ſtricturam repudiaret, ſin autem cauterium nihil proficeret, ad manus amputationem deveniendum eſſet, quæ quam anceps in hujuſmodi corporis temperamento remedium foret, experientia ſatis teſtatur; ad utrumque pariter inhibendum Corticis Peruviani vires, cujus feliciter exhibiti teſtimonia plura tum audiveram, experiri hic etiam placuit. Duodecimo igitur die ℈ij corticis mane exhibiti ſunt; &

quarta quaque hora repetiti ; ex quo, ſequenti mane, cum jam ejus unciæ dimidium hauſiſſet, dolorem plurimum mitigatum, tumoremque manus valde imminutum inveni, puris etiam aliquantum circa vulneris margines & intra faſcias conſpectum, limbuſque undique, qui pridie ex ſphacelo niger erat, jam ſeparari incipere viſus eſt : febris quoque, quæ toto prius tempore minime gravis, ſatis tamen ſenſibilis, cum hæmorrhagia incrementum ſumſerat, in totum quieverat, urina ſedimentum paucum, quod lutoſi potius aut albo-flaveſcentis quam lateritii vel roſacei coloris erat, deponente. Corticis uſus eodem modo per duos dies continuatus erat, deinde per duos amplius dies ter quotidie ſumtus, tum per tres alios dies bis duntaxat in die, adeo ut intra ſeptimanam unam duæ ejus unciæ datæ fuerant.

Interea tumor & inflammatio omnis evanuerunt, pus purum manabat, caro ſuccreſcebat, & dolor, qui tamen inter movendum ſatis gravis in carpo adhuc reſtabat, plurimum immunitus fuit. Per tres deinde ſeptimanas omnia bene ſe habebant, excepto quod rheumatico-arthriticus affectus, quo alias hyeme laborare ſolebat, nunc pedem, nunc acromion & ſcapulam unam vel ambas, cum tumore, invaſit ; febre interim vacuus erat, & appetitu ad ea, quæ permiſſa erant, valens. Deinde vero, Dec. 19, ſtomachus imbecillior fieri, dolor metacarpi cum tumore major; quæ cum ſequenti die augmentum ſumere viſa eſſent, tertio die pulſus aliquantum celerior factus eſt, & tumor metacarpi cum inflammatione abſceſſum minabatur, vulnere interim palmæ pus album & æquale, ut antea, fundente. Quarto autem die vulneris oræ veſiculis tumidæ, ad gangræ-

nam

nam tendere, cum copioſo ſaniei ſine ullo pure efluxu, manuſque tota & carpus tumore inflammatorio & graviſſimo dolore obſideri. Cortice igitur eodem, ut prius, modo exhibito, intra octo horas, cum vix tres ejus doſes hauſiſſet, dolor, qui antea acerbiſſimus erat, quaſi incantamento lenitus eſt, & ſequenti deligatione tumor manus dimidio ſubſediſſe, & pus laudabile manare videbatur. Urina primo ſatis intenſi erat ruboris, deinde paulatim dilutior evaſit, nullo, vel pauciſſimo ſedimento. Deinceps, ut præcaveretur recidiva, corticis unciam dimidiam ſingulis ſeptimanis ad ſextam uſque exhibui, ſcrupulis duobus per triduum bis quotidie datis, finemque quarto demum menſe laborioſæ huic curationi, qua tendines omnes muſculorum perforati & perforantis, præter eos, qui minimo digito inſerviunt, abſceſſerant, os etiam unum ex iis, quæ metacarpum, aliud eorum, quæ carpum conſtituunt, nudatum erat, abſceſſuſque unus & alter dorſo manus orti, finem impoſui.

Ex hiſtoriis hiſce, & præſertim ex ultima, ſatis conſtare exiſtimo, nihil hic ſociatis aliorum medicamentorum virtutibus, nihil peculiari humorum diatheſi, aut incognitæ cuidam idioſyncraſiæ, nihil ſpontaneæ ſymptomatum remiſſioni, nihil fortuitæ Criſi, & ſalutari per alias ſecretiones expurgationi, caſui denique nihil imputandum, ſed ſucceſſum omnem corticis ſolius viribus unice tribuendum eſſe.

Licet autem in hiſtoriis memoratis corticis pulverem duntaxat ſe in uſum duxiſſe omnes referant, ſi quis tamen aut ſtomacho imbecilli conſulturus, aut ex alia ratione, ipſum ea forma exhibere refugit; vix dubitarem reſinam ejuſdem aut extractum dimidia quantitate datum eundem effectum præſtiturum, cum

ad febres intermittentes, ubi præcipua ejus virtus enitescit, præparata ejusmodi corticis idem cum ipso valere quotidie videamus.

Quod si quis ex historia prima a D. Rushworth memorata, qui corticem, dum febris aderat continua, exhibere timuit, & remissionem exspectavit, febrem intermittentem in omnibus, qui citantur, ægrotis, latuisse contendat, adeoque nihil esse miri, si cortex ab hoste intra pomœria sua deprehenso victoriam reportaverit; huic reponere liceat, nihil ejusmodi in pluribus, imo contrarium plane in quibusdam, observatum, ut testantur satis idonei talium symptomatum judices; in ultima autem historia, ubi ipse, ut potui, ad omnia attentus eram, nihil me notasse latentis alicujus typi, aut febris præter solitum, eumque lentum, tenorem obsidentis, quodque vel ad continentem aliquam, multo minus ad intermittentem pertineret, nihil febrilis in urina sedimenti, nihil insoliti caloris, aut sitis, aut rigoris in una præcipue diei parte, nihil ariditatis vel nigritiei linguæ confirmare possum; & si rem vere reputemus, febrem, quæcunque aderat, solum fuisse symptomaticam in, veniemus, quæ secundum veterum medicorum placita (nec recentiores abnuunt, & ex re ipsa patet) intermittens esse nullo modo potest. Et quod ad hoc argumentum præcipue spectat, vires scil. cornicis in sphacelo sistendo non ex febre quadam intermittente, & latente profliganda in actum duci, dum hæc scribo, ad manus affertur scriptum nuper editum D. Bradley Chirurgi Londinensis, qui ad calcem responsi ad inconditum quendam medicamentarium fasciculum D. Dover, eundem felicem eventum habuisse corticis usum narrat in fœmina cachectica

chectica & leucophlegmatica; cui cum vulnus amplum & transversum superiore cruris parte ex casu contigisset, tertioque die febris vehemens cum pulsu frequenti & intermittente, lingua arida & nigra, aspectu torvo, & mente aliquatenus emota, supervenisset, gangrænaque interea totum fere crus occupasset, usu corticis quarta quaque hora exhibiti intra nycthemeri spatium gangrænam cohibitam, aliaque symptomata evanuisse; quinto autem die, corticis usu intermisso, omnia iterum reversa eodemque rursus sumpto sedata fuisse, & ægrotam convaluisse memorat.

Ex hac historia, ut & quibusdam e supra memoratis, apparet, non solum corticem, dum febris adest, exhiberi tuto & cum successu posse interdum, sed etiam febrem fortasse hujusmodi symptomaticam non esse e genere putridarum vulgarium, quæ etiam ideo a quibusdam scriptoribus medicis ad suum peculiare genus refertur, vel earum, quæ in intermittentes facessere sperantur; cum ad eas omnes usum corticis plerumque noxium, interdum lethalem observant medici, in hac autem salutarem fuisse evincunt facta a pluribus experimenta: sed hæc a Medicis ulterius expendenda.

Præterea ex historiis allatis notari meretur, quod licet in quibusdam proximam gangrænæ causam vulnera dederint, in omnibus tamen primam & præcipuam ex statu & conditione humorum desumendam videri; adeoque remedia intus exhibita quam ea, quæ extra applicari solent, citius & securius scopum attigisse.

Istæ, quas supra exhibui, sunt, quantum novi, omnes, quotquot de usu corticis ad hujusmodi morbos hactenus

hactenus editæ fuerunt, obſervationes; quibus plures ſine dubio quotidie ex praxi Chirurgorum hujus Urbis (quaſdam ipſe nuper ab aliis accepi) addi poterunt; quas ſi eodem ſucceſſu probari plerumque contigerit, quid obſtat, quo minus hunc ejuſdem uſum ad periculoſiſſimum & fere immedicabilem affectum ambabus ulnis amplectamur, ejuſque repertorem omni laude & præconio dignum judicemus?

Si ultra progredi vellem, & ad plures, quas in ſe cortex continet, virtutes digitum intendere liceret (quamvis ex eorum numero eſſe me minime optarem, qui cogitata ſua ſuſque deque per omnia verſant, & quæ vigilantes ſomniant, in experimenta de vita & valetudine aliorum perduci cupiunt) cum quantum ad hæmorrhagias narium, pulmonum, cæterarumque partium, per quas ſanguis e corpore eliminari poteſt, valeat, abunde Medicis notum ſit; ejuſdem etiam vires ad ſanguinis fluxum in externis vulneribus ſiſtendum, ubi ex nimia illius tenuitate aut acredine vaſa coire reſpuunt, Chirurgis ex propria experientia commendare poſſum; nec minus ad nimias excrementitiorum, vel etiam aliorum præter ſanguinem utilium ſuccorum evacuationes eundem plurimum valere ſæpius deprehendi.

Qualem effectum præſtare poterit mirabilis hicce cortex in ulceribus quibuſdam peſſimi moris, quæ Nomæ & Phagedænæ Chirurgis appellantur, & fortaſſe in herpetibus malignis, experientia deſtitutus nihil affirmare audeo; hoc tantum monuiſſe contentus, argumento ab analogia ducto, cum gangræna & ſphacelus ulcera ſint putrida & depaſcentia, illum non minus interdum fortaſſe efficere poſſe in aliis ejus generis affectibus: quod tamen non ſine prævia corporis

ris totius cura, re & tempore plerumque id in hiſce concedente, quod in ſphacelo ſecus eſt, & reſpectu ad univerſum corpus habito, nec ſine Medici docti & prudentis conſilio aggrediendum autumarem. Atque hoc modo memorando illi Hipp. l. de Arte initio, monito obtemperare, juvabit. " Mihi vero invenire " aliquid eorum, quæ nondum inventa ſunt, quod " ipſum notum, quam occultum eſſe præſtet, ſcien- " tiæ votum ac opus eſſe videtur: ſimiliterque & " ſemiperfecta ad finem perducere & abſolvere. " At vero verborum inhoneſtorum arte ad ea, quæ " ab aliis inventa ſunt, confundenda promtum " eſſe, nihil quidem corrigendo, eorum vero, qui " aliquid ſciunt, inventa apud ignaros columni- " ando; non ſane ſcientiæ votum aut opus eſſe vi- " detur, ſed proditio magis naturæ ſuæ, & igno- " rantia artis.

Ut paucis igitur abſolvam, quas ſupra attuli, hiſtoriæ non otioſorum cerebrorum ſunt figmenta, non anicularum deliramenta, non rudis plebeculæ jactationes, non ex hypotheſi aliqua ſtructæ narrationes, neque etiam Empiricorum de arcanis ſuis venditationes; ſed plurium in arte magiſtrorum fidelis experientia; quæ ab uno vel forte, vel induſtria, vel ingenio & ſagacitate primum excogitata, aliiſque in communem utilitatem tranſmiſſa, a quamplurimis uno ore conſentientibus minime fallax comprobata eſt: adeo ut quod hoc pacto in varia ætate, ſexu, corporis temperamento, & vitæ conditione, valere repertum eſt, in poſterum eodem modo valiturum vix dubitandum ſit, ſecundum veriſſimum illud Ciceronis effatum; " Opinionum commenta delet dies, naturæ " judicia confirmat."

VI. *Some*

VI. *Some Corrections and Amendments by* J. P. Breynius, *M. D. F. R. S. concerning the Generation of the Inſect called by him* Coccus Radicum, *in his Natural Hiſtory thereof, printed in the Year* 1731, *an Account of which is given in theſe* Philoſophical Tranſactions, N° 421, *tranſlated from the* Latin *by Mr.* Zollman, *F. R. S.*

IN the Natural Hiſtory of the *Coccus Radicum* lately publiſhed by me, when after many repeated Obſervations and Experiments (eſpecially thoſe of Pag. 16 and 17) I gave an Account of the Generation and Metamorphoſis of that Inſect, which uſes to ſtick to the Extremities of the Roots like a ſpherical Grain, and is commonly called *Coccus Polonicus*, I conjectured, that thoſe ſmall Flies which are often found among the *Coccus*, did not belong to the *Coccus*, but owed their Riſe to ſmall Worms of their own Kind, and were accidentally found among the *Coccus*; and as I could not find any Difference of Sex among the Worms of the *Coccus*, and following chiefly the Opinion of Signor *Ceſtoni* concerning the *Coccus* of the *Ilex* (however, as I freely own, not without ſome Repugnancy, and a fluctuating Mind) I ventured to aſſert, that our *Coccus* alſo is an Inſect of the Hermaphrodite Kind, which brings forth Eggs of itſelf, and from itſelf, and propagates its Species without

out

out being impregnated by the Concurrence of a Male.

But the Summer following I began to be ſenſible that my Opinion was erroneous, and about the End of it was quite convinced of my being in the wrong. This was Matter of Joy to me; for as the Diſcovery of a Truth hitherto unknown gives no ſmall Pleaſure to a Mind that loves Truth, ſo I am ſure, no body will deny, that this Pleaſure will be ſtill greater, if the Diſcovery is attended with an Acknowledgment and Redreſs of an Error one has been under before.

Having repeated my Obſervations with the greateſt Exactneſs, and examined them in the ſtricteſt Manner, at laſt I found that the Metamorphoſis, or Evolution, through which our *Coccus* paſſes, is as follows:

A. Of the Male.	B. Of the Female.
I. The Egg.	I. The Egg.
The Eggs are laid about the End of *July*, or the Beginning of *Auguſt*.	
II. A Worm with ſix Feet, no Wings.	II. A Worm with ſix Feet, no Wings.
The Worms come out of the Eggs about the Middle of *Auguſt*, till the Beginning of *September*.	

A. Of the Male.

III. The leſs ſpherical Grain; that is, the *Coccus*, ſtrictly ſo called, of the Bigneſs of a Grain of Poppy-Seed or Millet at fartheſt, gathered from the 9th of *June* till the Summer Solſtice, with other bigger *Cocci*.

IV. The leſs Worm with ſix Feet, no Wings. It comes out of the abovemention'd *Coccus*, from the Summer Solſtice 'till the Middle of *July*.

V. The Nymph which appears about the Beginning of *July* and the following Days.

VI. The Fly, the Male coming out from the Middle of *July* till the 24th of the ſame Month, which impregnates the Worm the Female, marked N° IV.

B. Of the Female.

III. The larger ſpherical Grain; or the *Coccus* of the Bigneſs of a Vetch, or as large as that of white Pepper, which is gathered from the Middle of *June* till about the Middle of *July*.

IV. The larger Worm with 6 Feet, no Wings. That is to ſay, the Female coming out in the Beginning of *July*, but chiefly about the Middle of the ſaid Month; which being impregnated by the Fly the Male N° VI, brings forth the Egg N° I.

This

This Inſect, under what Shape ſoever it appears, *viz.* either of a Grain, a Male Worm, a Nymph, a Fly, a Female Worm, or a Worm coming out of an Egg, always when preſſed and cruſhed, affords a Matter of a purple Colour, which however is obſerved to run moſt copious in the *Cocci* and the Worms, eſpecially the Female ones.

This may ſuffice at preſent for the Correction and Amendment of my ſhort Hiſtory of the *Coccus*, till theſe things may appear explained more at large, and illuſtrated with Figures, in the ſecond Part of it, which is to treat of the Chymical Examination of it, and of its uſe in Dying as well as Phyſick.

VII. *A Continuation of an Account of an Eſſay towards a Natural Hiſtory of* Carolina *and the* Bahama *Iſlands, by* Mark Catesby, *F. R. S. with ſome Extracts out of the fifth Set. By Dr.* Mortimer, *R. S. Secret.*

THE Accounts of the foregoing Sets of this Work are to be found in N° 415 and 420 of theſe *Tranſactions*: This fifth Set begins at Plate

81. *Pelicanus Americanus.* The Wood Pelican.

82. *Numenius albus.* The white Curlew.

Arum Aquaticum minus; ſive Ariſarum ſuitans, Pene nudo, Virginianum. D. Baniſter. Pluk. *Mantiſſ.* 28.

83. *Numenius fuſcus.* The brown Curlew.

Arum, Sagittariæ folio anguſto, acumine & auriculis acutiſſimis.

84. *Numenius Ruber.* The Red Curlew.

85. *Hæmatopus,* Will. p. 297. *Bellon.* Lib. III. p. 203. The Oyſter-Catcher, ſo called, becauſe it feeds upon Oyſters, which it finds gaping when left dry on the Banks at low Water.

Frutex Bahamenſis, foliis oblongis ſuccolentis fructu ſubrotundo unicum nucleum continente. The Bark of this ſmall Tree is uſed for tanning Sole-Leather.

86. *Anſeri Baſſano congener, Avis fluviatilis.* The great Booby.

An Thymelæa foliis obtuſis?

87. *Anſeri Baſſano affinis fuſca Avis.* Sloane *Hiſt. Jamaic.* The Booby. This Birds feeds on Fiſh, diving under Water after them, but is often robbed of his Prey by another voracious Bird, called the Man of War Bird [or *Albitroſſe*] The frequent Conteſts between theſe Birds are very diverting. The Author was credibly inform'd, that while the *Albitroſſe* are ſetting and hatching their Young, their Heads change from Brown to Scarlet, and become Brown again afterwards.

88. *Hirundo Marina minor capite albo.* Sloane *Hiſt. Jamaic.* p. 31. The Noddy. Theſe and the Boobies are ſuch ſtupid Birds as to ſuffer one to take them by Hand.

89. *La-*

89. *Larus major.* The laughing Gull. They take their Name from the Noiſe they make.

90. *Larus major roſtro inæquali.* The Cut-Water. They probably take their *Engliſh* Name from their commonly flying cloſe to the Water, from the Surface whereof they ſeem to ſcoop up ſome Food with the under Part of their Bill, which is much longer than the upper.

91. *Podicipes minor roſtro vario.* The Pied Bill Dopchick.

92. *Anſer Canadenſis.* The *Canada* Gooſe.

93. *Anas Bahamenſis, roſtro plumbeo macula Aurantii coloris.* The *Ilathera* Duck.

Chryſanthemum Bermudenſe, Leucoij foliis virentibus craſſis. Pluk. Alm. 102.

94. *Anas criſtatus.* The round creſted Duck.

95. *Anas minor, purpureo capite.* The Buffel's-Head Duck.

96. *Anas Americanus lato roſtro.* The Blue-wing'd Shoveler.

97. *Anas Americanus criſtatus elegans.* The Summer Duck. This is one of the moſt beautiful of Birds, it being finely variegated with Red, Purple, Blue, Green, Black and White. They build in Holes of hollow Trees made by Woodpeckers; and their Young, before they can fly, hold themſelves by their Bills faſt on the Back of the old One, which flies with it from the Neſt to the Water, and back again upon the Approach of any Danger.

98. *Anas minor ex albo & fuſco vario.* The little brown Duck.

Frutex

Frutex Buxi foliis oblongis, baccis pallide viridibus apice donatis. Soap-Wood. The Bark and Leaves of this Tree being bruiſed and mixed with Water produce a Lather, and are made uſe of to waſh Cloaths and Linnen; but to the laſt they give a Yellowneſs. It grows in the *Bahama* ſlands.

99. *Querquedula.* The blue-winged Teal. They feed on Rice, and becoming exceeding fat, are reckoned the beſt Meat of the Duck Kind.

100. *Querquedula Americana variegata.* The white-faced Teal.

FINIS.

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